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The Effect of Green Innovation on SMEs' Business Sustainability in Oman: The Mediating Role of Green Consumer Purchasing Behavior..

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ABSTRACT
This study investigates the effect of Green Innovation (GI) on Small and Medium-sized Enterprises' (SMEs) Business Sustainability (SBS) in the Sultanate of Oman, emphasizing the mediating role of Green Consumer Purchasing Behavior (GCPB). Integrating the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB), the research develops a dual-theory framework linking organizational innovation capabilities with consumer-driven behavioral mechanisms. Using a positivist, quantitative research design, data were collected from 150 SMEs operating across multiple sectors in Oman. The analysis was performed using Partial Least Squares Structural Equation Modeling (PLS-SEM) via SmartPLS 4 to assess measurement and structural relationships among the constructs. The results demonstrate that GI has a significant impact on SMEs' sustainability in both economic and social dimensions, whereas its direct effect on environmental sustainability is insignificant. However, when GCPB is incorporated as a mediator, the indirect relationships between GI and all three dimensions of SBS become significant. Specifically, GCPB fully mediates the GI-environmental sustainability link and partially mediates the GI-economic and GI–social sustainability links. These findings confirm that consumer purchasing behavior serves as a critical behavioral bridge, translating internal innovation efforts into measurable sustainability outcomes. The study further shows that GI explains 54.2% of the variance in GCPB and, together with GCPB, accounts for 33.7%, 44.3%, and 63.6% of the variance in economic, environmental, and social sustainability dimensions, respectively. Theoretically, this research extends sustainability literature by integrating strategic (NRBV) and behavioral (TPB) perspectives, highlighting that the success of green innovation depends on both firm-level innovation capabilities and consumer-level behavioral intentions. Practically, the results provide insights for SME managers and policymakers by emphasizing the need to align innovation practices with market education and consumer awareness initiatives. Encouraging eco-innovation, promoting green financing schemes, and fostering consumer trust through transparent environmental communication can accelerate the transition toward sustainable business models. Contextually, the study provides empirical evidence supporting Oman Vision 2040, highlighting the importance of innovation, environmental stewardship, and responsible consumption in achieving national sustainability objectives. Overall, the findings reveal that green innovation and consumer purchasing behavior are mutually reinforcing mechanisms that advance SME competitiveness and contribute to Oman's sustainable economic transformation....

Keywords: *Green Innovation; Green Consumer Purchasing Behavior; SME Business Sustainability; NRBV; TPB; Oman Vision 2040; PLS-SEM.*

1. INTRODUCTION:

1.1 Background

Sustainability has become a defining concern for modern enterprises as global environmental challenges intensify and consumer expectations evolve. Businesses increasingly recognize that long-term competitiveness depends on integrating environmental and social considerations into their core operations (Amoako et al., 2022; Jia et al., 2023). Small and medium-sized enterprises (SMEs) play a crucial role in job creation, innovation, and regional economic diversification (Gherghina et al., 2020). However, SMEs also contribute substantially to industrial pollution, estimated at nearly 70 percent worldwide (Malesios et al., 2021), highlighting the urgent need for sustainable transformation. In the Sultanate of Oman, SMEs form the backbone of the economy and are central to the country's long-term development strategy, Oman Vision 2040. The vision

explicitly emphasizes innovation, environmental stewardship, and economic diversification as the foundation for sustainable growth (Oman Supreme Council for Planning, 2019). Consequently, encouraging SMEs to adopt green innovation (GI), that is, environmentally oriented product, process, or technological innovation, has become a national priority. GI enables enterprises to enhance resource efficiency, minimize waste, and strengthen market differentiation while supporting the transition toward a low-carbon, knowledge-based economy. At the global policy level, the United Nations Environment Programme (UNEP, 2021) and the World Economic Forum (2023) have both emphasized SMEs' essential role in achieving the Sustainable Development Goals (SDGs), especially those targeting responsible production, innovation, and climate action (SDG 12, 9, 13). These institutions urge governments to strengthen policy support that accelerates the adoption of renewable energy, eco-efficient processes, and circular economy principles by SMEs. In Oman, such directions are reflected in initiatives promoting cleaner production, waste minimization, and sustainable entrepreneurship (Al-Alawi & Jawarneh, 2023).

1.2 SME Sustainability Challenges in Oman

Despite favorable policy frameworks, Omani SMEs still face financial, technological, and knowledge constraints that hinder the integration of green innovation practices (Alqassabi, 2020; Maphumulo et al., 2023). Limited access to green financing, high initial investment costs, and a shortage of technical expertise continue to be significant barriers. Moreover, awareness of the business value of environmental innovation is often low, particularly among micro- and small-scale enterprises. These limitations have broader implications. Oman generates approximately 2.5 million tons of municipal solid waste each year, with more than 90 percent disposed of in landfills (Be'ah, 2022; NCSI, 2023).

Carbon-intensive activities further compound environmental pressures, as the country's per-capita CO_2 emissions remain among the highest in the region (World Population Review, 2025). Strengthening SMEs' commitment to green innovation is therefore vital to reducing ecological impacts while sustaining competitiveness in an increasingly eco-conscious marketplace.

1.3 Linking Green Innovation and SME Business Sustainability

Green Innovation (GI) represents a strategic approach for SMEs to achieve SME Business Sustainability (SBS) the balanced pursuit of economic performance, social well-being, and environmental protection. From the perspective of the Natural Resource-Based View (NRBV) (Hart, 1995), firms that proactively prevent pollution, steward products responsibly, and invest in sustainable development build rare and inimitable capabilities that enhance long-term survival. In SMEs, GI is manifested through cleaner production techniques, renewable energy utilization, waste reduction, eco-design, and product life-cycle optimization (Rustiarini et al., 2022; Arsawan et al., 2021).

Empirical studies demonstrate that such practices can simultaneously reduce costs, strengthen brand reputation, and create new market opportunities (Aboelmaged & Hashem, 2019). Within Oman's Vision 2040 framework, green innovation also supports the country's national objectives of economic diversification and a knowledge-driven economy. By adopting energy-efficient technologies and sustainable materials, SMEs can lower their operational costs, attract environmentally conscious consumers, and contribute to national climate commitments. Nevertheless, despite growing policy interest, empirical evidence explaining how GI enhances SME sustainability in developing economies remains limited, particularly in the context of the Gulf Cooperation Council (GCC). Most prior research has focused on large corporations or macro-policy analyses, overlooking the behavioral and market-driven mechanisms of SMEs.

1.4 The Mediating Role of Green Consumer Purchasing Behavior

Recent scholarship suggests that the market's response to green innovation is a decisive factor in determining whether such practices translate into measurable sustainability outcomes. Here, Green Consumer Purchasing Behavior (GCPB), defined as consumers' preference for products and services that minimize environmental harm, plays a pivotal mediating role. According to the Theory of Planned Behavior (TPB) (Ajzen, 1991), behavioral intentions are shaped by attitudes toward behavior, subjective norms, and perceived behavioral control.

When consumers hold favorable attitudes toward eco-friendly products, perceive social approval for sustainable consumption, and feel capable of acting on these beliefs, they are more likely to purchase from environmentally responsible SMEs. This, in turn, reinforces firms' incentives to invest in GI. Empirical findings support this dynamic. Studies have shown that consumers' environmental awareness positively influences their willingness to pay a premium for green products (Limbu & Ahamed, 2023; Yadav & Pathak, 2017).

SMEs that effectively communicate the ecological benefits of their innovations can, therefore, capture greater market share and enhance their overall sustainability performance. By integrating GCPB as a mediator, this study captures the feedback loop between internal innovation efforts and external consumer behavior, bridging the strategic and behavioral dimensions of sustainability.

1.5 Research Gaps and Purpose

Although literature increasingly acknowledges green innovation as a driver of sustainability, the mediating influence of GCPB has rarely been examined at the firm level, especially within developing-country contexts. In Oman, existing research focuses primarily on green entrepreneurship, renewable energy, or policy implementation (Sulaiman, 2025; Alraja et al., 2022), leaving a gap in understanding how consumer behavior amplifies the effects of GI on SME performance. Moreover, while the NRBV explains the resource-based

advantages of environmental innovation, it does not account for the behavioral mechanisms that connect firms with markets. Combining NRBV with TPB thus provides a comprehensive theoretical foundation: NRBV elucidates why firms adopt green innovations (resource and capability logic), whereas TPB clarifies how consumer attitudes and intentions translate these innovations into sustainable outcomes. Accordingly, this study addresses the following research questions: RQ1: How does Green Innovation (GI) influence SME Business Sustainability (SBS) in Oman? RQ2: To what extent does Green Consumer Purchasing Behavior (GCPB) mediate the relationship between GI and SBS? The corresponding objectives are: RO1: To examine the direct effect of Green Innovation on SME Business Sustainability. RO2: To assess the mediating role of Green Consumer Purchasing Behavior in the GI–SBS relationship.

1.6 Significance of the Study

Theoretically, this research extends sustainability literature by developing and empirically validating a dual-theory model (NRBV + TPB) within the SME context. It introduces GCPB as a mediating mechanism linking organizational innovation and sustainability outcomes, thereby integrating strategic and behavioral perspectives. Practically, the findings will provide actionable insights for SME managers and policymakers. For managers, understanding how green innovations influence consumer decisions can inform product design, marketing, and operational strategies that maximize sustainability payoffs.

For policymakers, the results will inform the development of incentive schemes, such as green financing and consumer awareness programs, that promote eco-innovation and sustainable consumption in alignment with Oman Vision 2040. At a broader level, the study contributes to achieving several SDGs, particularly SDG 9 (Industry, Innovation and Infrastructure), SDG 12 (Responsible Consumption and Production), and SDG 13(Climate Action).

1.7 Organization of the Paper

The article's structure is presented as follows. Section 2 presents the pertinent literature on green innovation, the sustainability of SMEs, and the behavior of green consumers, which serves as the basis for developing hypotheses. Section 3 explains the research methods and the ways of gathering data. Section 4 presents and explains the empirical results. Finally, Section 5 concludes with a discussion of the theoretical and practical implications, limitations, and suggestions for future research.

2. Literature Review and Conceptual Framework

2.1 Green Innovation (GI)

Green Innovation refers to the creation or improvement of products, processes, and technologies that minimize negative environmental impacts while enhancing operational efficiency and competitiveness (Aboelmaged & Hashem, 2019). Within the SME context, GI includes developing eco-friendly products, adopting cleaner production methods, recycling materials, and integrating renewable energy sources (Arsawan et al., 2021; Rustiarini et al., 2022). These innovations allow SMEs to reduce waste and emissions, improve resource utilization, and respond to the growing demand for sustainable solutions. From the perspective of the Natural Resource-Based View (NRBV) (Hart, 1995), green innovation acts as a strategic capability that enables firms to create valuable, rare, and inimitable resources. By investing in pollution prevention, product stewardship, and sustainable development, SMEs can differentiate themselves in competitive markets and secure long-term advantages (Hart & Dowell, 2011).

Research across developing economies confirms that green innovation improves both environmental and financial performance by reducing production costs, enhancing reputation, and attracting eco-conscious consumers (Gomes et al., 2023; Sulaiman, 2025). In Oman, green innovation is regarded as a key mechanism for achieving Vision 2040, which emphasizes innovation, economic diversification, and environmental stewardship (Al-Alawi & Jawarneh, 2023). Nevertheless, many SMEs encounter barriers, such as limited funding and a lack of technological knowledge (Alqassabi, 2020). Empirical studies demonstrate that the successful adoption of green innovation fosters a positive cycle of sustainable production, consumer trust, and market expansion (Waqas et al., 2024; Omowole et al., 2024).

Accordingly, green innovation serves as a critical driver of SME business sustainability by linking technological advancement with environmental responsibility. It represents a proactive path for SMEs to build resilience, comply with emerging regulations, and align with global sustainability standards.

2.2 Green Consumer Purchasing Behavior (GCPB)

Green Consumer Purchasing Behavior (GCPB) refers to the tendency of consumers to prefer and purchase products that cause minimal environmental harm and reflect sustainable production practices (Joshi & Rahman, 2015). It reflects a consumer's awareness of environmental issues and their willingness to act responsibly through buying decisions (Yadav & Pathak, 2017). As markets become increasingly eco-conscious, consumer preferences have become a decisive factor driving organizational change. SMEs that respond to these preferences through green innovation gain stronger market positions and loyalty from sustainability-oriented customers (Soomro et al., 2020). The Theory of Planned Behavior (TPB) (Ajzen, 1991) offers a useful framework for understanding GCPB. It proposes that behavioral intention is influenced by attitude toward the behavior, subjective norms, and perceived behavioral control.

Consumers with positive attitudes toward green products, who perceive social approval for sustainable consumption and have confidence in their ability to act, are more likely to purchase from eco-innovative SMEs (Limbu & Ahamed, 2023). Empirical studies show that GCPB mediates the link between firm-level green initiatives and sustainability outcomes (Andreica Mihuț et al., 2025). When SMEs invest in green innovation, they send signals

to the market that activate consumer attitudes and subjective norms toward sustainable consumption. This behavioral response strengthens demand for eco-friendly products and translates innovation efforts into tangible economic and environmental gains.

In this sense, GCPB acts as a behavioral bridge that connects the technical dimension of green innovation to the performance dimension of sustainability. In Oman's emerging green market, consumer awareness is gradually increasing due to government campaigns and Vision 2040 initiatives promoting sustainable consumption. Integrating GCPB into the model, therefore, captures a critical feedback loop whereby innovation stimulates demand, and demand reinforces innovation. This mutual relationship is particularly significant for SMEs that depend on consumer trust and word-of-mouth promotion to compete in local markets.

2.3 SME Business Sustainability (SBS)

SME Business Sustainability (SBS) refers to the ability of small and medium enterprises to maintain long-term viability by balancing economic growth, social responsibility, and environmental stewardship (Eikelenboom & de Jong, 2019; Khan et al., 2021). The Triple Bottom Line (TBL) framework identifies these three dimensions as essential for achieving comprehensive sustainability. Economic sustainability ensures financial stability and competitive performance; social sustainability focuses on employee well-being and community engagement; environmental sustainability aims to reduce resource consumption and pollution. For SMEs, sustainability is not only a moral obligation but a strategic necessity to cope with resource constraints and volatile markets (Souto, 2022).

Adopting green innovation enhances environmental performance, reduces waste, and stimulates socially responsible operations (Zhuang et al., 2021). Empirical research confirms that eco-innovative SMEs exhibit higher levels of economic resilience, brand equity, and stakeholder loyalty (Omowole et al., 2024). In the Omani context, Vision 2040 explicitly promotes SME sustainability through innovation and environmental governance. However, many SMEs remain at the early stages of this transition due to limited technical capacity and financial support (Al-Alawi & Jawarneh, 2023). Thus, enhancing SME sustainability requires both internal innovation and external market mechanisms such as consumer demand for green products. This study proposes that GI directly improves SBS and indirectly through GCPB, which translates innovation efforts into sustained market success.

2.4 Conceptual Framework and Hypotheses Development

2.4.1Theoretical Integration

Grounded in the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB), this study develops an integrated model linking Green Innovation (GI), Green Consumer Purchasing Behavior (GCPB), and SME Business Sustainability (SBS).

The NRBV explains how green innovation builds strategic resources that enhance environmental and economic performance. The TPB clarifies how consumer attitudes and intentions translate organizational innovation into market outcomes.

2.4.2 Hypotheses Development

• H1: Green Innovation positively influences SME Business Sustainability.

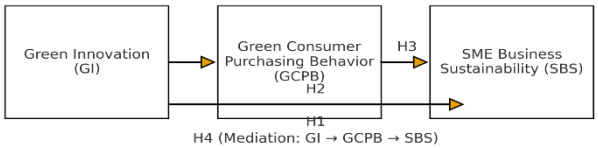
• H2: Green Innovation positively affects Green Consumer Purchasing Behavior.

• H3: Green Consumer Purchasing Behavior positively influences SME Business Sustainability.

• H4: Green Consumer Purchasing Behavior mediates the relationship between Green Innovation and SME Business Sustainability.

2.4.3 Conceptual Framework (Description)

The framework positions GI as the independent variable, SBS as the dependent variable, and GCPB as the mediating variable. Arrows flow from GI to SBS (direct effect) and from GI → GCPB → SBS (indirect effect). This dual path illustrates that green innovation not only improves SME sustainability through operational efficiency but also through consumer-driven behavioral mechanisms. The model aligns with Oman Vision 2040 by linking innovation, consumption, and sustainability as mutually reinforcing drivers of green economic growth.



A growing body of research confirms that green innovation (GI) serves as a strategic capability that enables small and medium-sized enterprises (SMEs) to achieve long-term sustainability. Studies such as those by Aboelmaged and Hashem (2019) and Rustiarini et al. (2022) have demonstrated that adopting eco-innovative processes significantly enhances both environmental and financial performance by reducing waste and operational costs. Similarly, Arsawan et al. (2021) and Zhuang et al. (2021) found that green product and process innovations enhance eco-efficiency and organizational reputation, aligning with the Natural Resource-Based View (NRBV) perspective, which posits that GI is a valuable and rare strategic asset.

Research conducted within emerging and developing economies has expanded this evidence base. Omowole et al. (2024) conceptualized green practices in SMEs and found that eco-innovation supports sustainable competitiveness through cost efficiency and differentiation. In Oman, Sulaiman (2025) highlighted that green product innovation mediates the relationship between market orientation and sustainable performance, underscoring the critical role of innovation in achieving environmental and economic goals under Oman Vision 2040. Regional reviews by Waqas et al. (2024) and Gazi

et al. (2024) further support that green capabilities and innovation-driven practices enhance the sustainability of supply chains and SME competitiveness across the GCC region. However, several studies (e.g., Aboelmaged & Hashem, 2019; Omowole et al., 2024) note that consumer-driven behavioral mechanisms remain underexplored, leaving a gap between technological innovation and market adoption.

Parallel research on green consumer purchasing behavior (GCPB) provides insights into how consumer attitudes and intentions mediate this gap. Drawing on the Theory of Planned Behavior (TPB) (Ajzen, 1991), scholars such as Yadav and Pathak (2017) and Joshi and Rahman (2015) confirmed that attitude toward behavior, subjective norms, and perceived behavioral control are major predictors of green purchase intention. Limbu and Ahamed (2023) further found that eco-attitudes and social norms have a positive impact on consumers' willingness to pay for green products. Meanwhile, Andreica Mihuț et al. (2025) demonstrated that GCPB mediates the relationship between firms' green initiatives and sustainability outcomes, suggesting that consumer behavior acts as a behavioral bridge that translates corporate green innovation into tangible sustainability performance.

The literature also emphasizes the significance of SME Business Sustainability (SBS) as a multidimensional outcome encompassing economic, environmental, and social aspects. Eikelenboom and de Jong (2019) identified dynamic capabilities as essential drivers of SME sustainability, while Khan et al. (2021) and Souto (2022) confirmed that innovation practices and ethical orientation foster long-term competitiveness. Zhuang et al. (2021) provided empirical evidence that SMEs integrating green initiatives achieve superior stakeholder trust and operational efficiency. Within Oman's Vision 2040 framework, Al-Alawi and Jawarneh (2023) emphasized that innovation and environmental governance are crucial in facilitating SME transformation toward sustainability, despite challenges such as limited funding and low technological readiness persisting.

Overall, the reviewed literature indicates a strong and consistent positive relationship between Green Innovation and SME Business Sustainability, supported by NRBV theory, while also revealing that Green Consumer Purchasing Behavior plays a crucial mediating role through the TPB lens. Despite the theoretical and empirical advancements, a contextual gap exists regarding SMEs in developing economies, particularly in Oman, where consumer behavior, innovation capacity, and sustainability performance have not been thoroughly examined within an integrated model.

3. Methodology

The research paradigm represents a structured collection of interconnected ideas, assumptions, and beliefs that guide the researcher's philosophical orientation. It determines how knowledge is developed, interpreted, and validated within a study. This research adopted the positivist paradigm, emphasizing objectivity, measurement, and empirical testing. According to Helmi and Alharahsheh (2020), positivism aligns with the scientific method, where knowledge is derived from observable phenomena rather than subjective interpretation. This approach is suitable for investigating the cause-and-effect relationships between Green Innovation (GI), Green Consumer Purchasing Behavior (GCPB), and SMEs' Business Sustainability (SBS).

The study employed a deductive quantitative approach, which begins with theoretical assumptions drawn from the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB), followed by empirical validation through data analysis. The deductive process allows hypotheses to be tested systematically, ensuring that theoretical models are confirmed or refined based on statistical findings. Quantitative methods were employed to collect measurable data using structured questionnaires that contained closed-ended questions related to the study variables.

3.1 Target Population and Sampling Technique

The target population of this study consisted of small and medium-sized enterprises (SMEs) operating across various sectors in the Sultanate of Oman. SMEs were selected because they represent the backbone of Oman's economy and are central to achieving Oman Vision 2040 sustainability goals.

According to the SME Development Authority (2024), there are approximately 20,769 registered SMEs in Oman. Due to the diversity of SME activities, stratified random sampling was employed to ensure proportional representation across different business categories (micro, small, and medium). This method minimized sampling bias and captured a variety of green innovation practices and consumer-oriented sustainability behaviors.

3.2 Sample Size Determination

The sample size was determined using Taro Yamane's (1973) formula for known populations at a 95% confidence level and a 5% margin of error. The calculation suggested a theoretical sample of approximately 393 SMEs; however, due to accessibility and response constraints, 150 valid responses were collected and analyzed.

This sample size satisfies the minimum requirement for Partial Least Squares–Structural Equation Modeling (PLS-SEM) analysis, following the "10-times rule" proposed by Hair et al. (2019), which recommends at least ten cases for each structural path directed toward a construct. Therefore, the sample collected is considered statistically sufficient and representative for model testing.

3.3 Data Collection Procedure

Data was collected between May and August 2025 using a structured questionnaire distributed electronically and physically to SME managers and decision-makers. All measurement items were rated on a five-point Likert scale ranging from *1 (Strongly Disagree)* to *5 (Strongly Agree)*. Respondents were informed of the study's objectives, assured confidentiality, and asked to provide honest and voluntary participation.

3.4 Measurement of Variables

The research constructs were operationalized based on prior validated studies to ensure theoretical alignment and content validity.

- Green Innovation (GI): Items were adapted from Rui and Lu (2021), Enbaia et al. (2024), and Yadegaridehkordi (2023), focusing on product and process innovations that enhance environmental efficiency.
- Green Consumer Purchasing Behavior (GCPB): Items were adapted from Kim and Choi (2005), do Paço et al. (2014), and Mabkhot (2024), emphasizing environmentally responsible purchasing decisions within SMEs.
- SME Business Sustainability (SBS): Items were derived from Le et al. (2024) and Khan and Quaddus (2015), reflecting economic, environmental, and social dimensions of sustainability.

Table 3.1 Measurement Items and Referenced Sources for Each Construct

Code	Measurement Items	Adapted
Green Innovation (GI)		
GI_1	Our company is enhancing the manufacturing process to minimize material consumption.	Rui & Lu (2021). Zhang, Xiue, Meng, Qia (2021); Marco-Lajara et al. (2022); Enbaia et al. (2024)
GI_2	Our enterprise develops new products with simplified packaging	Rui & Lu (2021)
GI_3	Our enterprise improves operational processes to meet environmental standards.	Rui & Lu (2021). Zhang, Xiue, Meng, Qia (2021)
GI_4	Our enterprise selects product materials that are easily degradable from raw materials.	Rui & Lu (2021). Yadegaridehkordi (2023); Marco-Lajara et al. (2022); Enbaia et al. (2024)
GI_5	Our enterprise improves the manufacturing process to reduce environmentally harmful emissions.	Yadegaridehkordi (2023); Marco-Lajara et al. (2022); Enbaia et al. (2024)
Green Consumer Purchasing Behavioral (GCPB)		
GCPB_1	Our enterprise checks the labels for environmentally safe ingredients when purchasing materials.	Jaiswal & Kant (2018); Channa et al. (2022)
GCPB_2	Our enterprise makes every effort to buy products from recycled sources.	Kim & Choi (2005); do Paço et al. (2014)
GCPB_3	Our enterprise chooses to buy environmentally friendly products.	Kim & Choi (2005); Mabkhot (2024); Jaiswal & Kant (2018); Channa et al. (2022)
GCPB_4	Our enterprise evaluates suppliers' environmental practices when purchasing materials.	Jaiswal & Kant (2018)
GCPB_5	Our enterprise minimizes the purchasing of materials with excessive packaging.	Do Paço et al. (2014)
GCPB_6	Our enterprise prioritizes purchasing energy-efficient products	do Paço et al. (2014); Mabkhot (2024); Channa et al. (2022)
SMEs Business Sustainability SBS-environmental (ENV)		
SBS_ENV_1	Our enterprise produces high-quality products with reduced environmental impact.	Becerra-Vicario et al. (2023). Le et al. (2024)
SBS_ENV_2	Our enterprise minimizes environmental impact by efficiently using utilities (e.g., electricity, water).	Le et al. (2024). Yadegaridehkordi (2023); Kurniawati et al. (2022); Khan & Quaddus (2015)

SBS_ENV_3	Our enterprise reduces waste by efficiently streamlining operational activities.	Le et al. (2024). Yadegaridehkordi (2023); Khan & Quaddus (2016, 2017); Kurniawati et al. (2022)
SBS_ENV_4	Our enterprise maintains cleanliness in daily operations to meet environmental health standards.	Khan & Quaddus (2018)
SMEs Business Sustainability SBS-Social (SOC)		
SBS_SOC_1	Our enterprise supports initiatives that enhance the well-being of the local community.	Kurniawati et al. (2022); Khan & Quaddus (2015)
SBS_SOC_2	Our enterprise supports employment initiatives that improve the livelihoods of employees.	Khan & Quaddus (2015)
SBS_SOC_3	Our enterprise enhances social recognition by informing the community about its environmental contributions.	Le et al. (2024); Khan & Quaddus (2016); Nguyen & Nguyen (2020)
SBS_SOC_4	Our enterprise promotes work-life balance for employees	Khan & Quaddus (2016)
SBS_SOC_5	Our enterprise encourages employees to be highly environmentally committed.	Nguyen & Nguyen (2020)
SMEs Business Sustainability SBS- economic (ECO)		
SBS_ECO_1	Our enterprise collaborates with government representatives to support business growth and development.	Le et al. (2024); Nguyen & Nguyen (2020); Becerra-Vicario et al. (2023); Khan & Quaddus (2015)
SBS_ECO_2	Our enterprise enhances cost efficiency through environmentally friendly purchasing practices in operational business activities.	Nguyen & Nguyen (2020); Le et al. (2024); Becerra-Vicario et al. (2023); Khan & Quaddus (2016)
SBS_ECO_3	Our enterprise strengthens customer relationships by promoting products with strong environmental performance.	Le et al. (2024); Nguyen & Nguyen (2020)
SBS_ECO_4	Our enterprise has achieved growth in market share through environmentally friendly practices.	Nguyen & Nguyen (2020)

3.5 Data Analysis Techniques

Data analysis was carried out using SmartPLS version 4.0, which was employed for Partial Least Squares Structural Equation Modeling (PLS-SEM) to evaluate both the measurement and structural models.

PLS-SEM was chosen due to its suitability for small sample sizes and its predictive focus in complex models involving multiple latent constructs (Hair et al., 2021; Usakli & Rasoolimanesh, 2023). The analysis included:

The outer loading results confirm that all indicators demonstrate acceptable reliability and contribute meaningfully to their respective constructs. As shown, the loadings for Green Consumer Purchasing Behavior (GCPB) range from 0.697 to 0.786, indicating that all six items are strongly associated with the latent construction, with GCPB6 and GCPB1 showing the highest contributions. Although GCPB4 (0.697) is slightly below the 0.70 threshold, it was retained due to its theoretical significance in reflecting supplier evaluation behavior.

The Green Innovation (GI) construct displays high loadings between 0.704 and 0.886, confirming strong indicator reliability; notably, GI5 (0.886) exhibits the most significant contribution, emphasizing the importance of emission reduction and environmental improvement practices among Omani SMEs. Similarly, the SMEs' Business Sustainability (SBS) construct demonstrates consistently strong outer loadings across its three dimensions, economic (0.748–0.932), environmental (0.767–0.919), and social (0.725–0.790).

Within these, SBS_ECO1 (0.932) and SBS_ENV1 (0.919) exhibit the highest values, indicating that collaboration with government entities and the production of environmentally responsible products are the most significant sustainability indicators. Overall, all loadings exceed or closely approach the recommended threshold of 0.70 (Hair et al., 2021), confirming that the indicators reliably measure their underlying constructs. These results demonstrate high indicator reliability and convergent validity, providing strong empirical support for the adequacy of the measurement model and justifying its use for further reliability and structural analyses, see Table 3.2

Table 3.2 outer loading

Items	Outer loadings
GCPB1 <- GCPB	0.786
GCPB2 <- GCPB	0.732
GCPB3 <- GCPB	0.734
GCPB4 <- GCPB	0.697
GCPB5 <- GCPB	0.729
GCPB6 <- GCPB	0.774
GI1 <- GI	0.739
GI2 <- GI	0.785
GI3 <- GI	0.799
GI4 <- GI	0.704
GI5 <- GI	0.886
SBS _ECO1 <- SBS _ECO	0.932
SBS _ECO2 <- SBS _ECO	0.748
SBS _ECO3 <- SBS _ECO	0.855
SBS _ECO4 <- SBS _ECO	0.865
SBS _ECO5 <- SBS _ECO	0.874
SBS-ENV1 <- SBS-ENV	0.919
SBS-ENV2 <- SBS-ENV	0.823
SBS-ENV3 <- SBS-ENV	0.796
SBS-ENV4 <- SBS-ENV	0.767
SBS-SCO1 <- SBS-SCO	0.790
SBS-SCO2 <- SBS-SCO	0.747
SBS-SCO3 <- SBS-SCO	0.725
SBS-SCO4 <- SBS-SCO	0.751
SBS-SCO5 <- SBS-SCO	0.730

Sources: smart PLS.4.1.1.6

The results of the measurement model demonstrate strong indicator reliability, internal consistency, and validity across all constructs (see Table 3.3). All outer loading values exceeded or closely approached the recommended threshold of 0.70, confirming that the observed indicators reliably represent their corresponding latent variables. Table 3.4 presents the Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE) values to further evaluate construct reliability and convergent validity. Cronbach's alpha coefficients ranged from 0.805 to 0.908, well above the 0.70 benchmark, indicating satisfactory internal consistency among items. Composite reliability (ρc) values between 0.865 and 0.932 and rho-A values above 0.80 reinforce this reliability, while AVE scores ranging from 0.551 to 0.734 confirm convergent validity, showing that each construct explains more than 50 percent of the variance of its indicators (Hair et al., 2021).

The results of Table 3.5 further establish discriminant validity using both the Heterotrait–Monotrait ratio (HTMT) and the Fornell–Larcker criterion. All HTMT values fall below the conservative threshold of 0.90, demonstrating that each construct is empirically distinct. Likewise, the Fornell–Larcker test shows that the square roots of the AVE values (diagonal entries) are greater than their corresponding inter-construct correlations (off-diagonal entries), providing additional evidence of

discriminant validity. Collectively, the outcomes presented in Tables 1–3 confirm that the measurement model exhibits robust reliability, strong convergent validity, and satisfactory discriminant validity, ensuring that the latent constructs of Green Innovation (GI), Green Consumer Purchasing Behavior (GCPB), and SMEs' Business Sustainability (SBS) are statistically sound and suitable for subsequent structural model analysis

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Table 3.3 Construct reliability and validity

	Cronbach's alpha	Composite reliability (rho_a)	Composite reliability (rho_c)	Average variance extracted (AVE)
GCPB	0.837	0.842	0.880	0.551
GI	0.842	0.845	0.889	0.617
SBS _ECO	0.908	0.911	0.932	0.734
SBS-ENV	0.845	0.849	0.897	0.686
SBS-SCO	0.805	0.809	0.865	0.561

sources: smart PLS.4.1.16

Table 3.4 Discriminant validity - Heterotrait-monotrait ratio (HTMT)

	GCPB	GI	SBS _ECO	SBS-ENV	SBS-SCO
GCPB					
GI	0.874				
SBS _ECO	0.635	0.583			
SBS-ENV	0.779	0.624	0.602		
SBS-SCO	0.902	0.888	0.714	0.826	

sources: smart PLS.4.1.1.6

Table 3.5: Fornell-Larcker criterion

	GCPB	GI	SBS _ECO	SBS-ENV	SBS-SCO
GCPB	0.742				
GI	0.736	0.785			
SBS _ECO	0.562	0.512	0.857		
SBS-ENV	0.663	0.524	0.531	0.828	
SBS-SCO	0.749	0.736	0.612	0.678	0.749

sources: smart PLS.4.1.1.6

The results of the structural model, summarized in Table 3.6, indicate substantial explanatory power across all dependent constructs. The R^2 values range from 0.337 to 0.636, with the adjusted R^2 values between 0.328 and 0.631, signifying that the model explains a considerable proportion of variance in the endogenous variables. Specifically, Green Innovation (GI) explains 54.2% of the variance in Green Consumer Purchasing Behavior (GCPB). In comparison, GCPB and GI together account for 33.7%, 44.3%, and 63.6% of the variance in the economic (SBS_ECO), environmental (SBS_ENV), and social (SBS_SCO) dimensions of SMEs' sustainability, respectively. These findings demonstrate moderate to substantial explanatory strength (Hair et al., 2021). The effect size (f^2) results presented in Table 3.7 further reveal the relative contribution of each exogenous construct to its corresponding endogenous variable. GI has a significant effect on GCPB ($f^2 = 1.182$), underscoring its central role in shaping consumer purchasing behavior. The mediating paths from GCPB to the three sustainability dimensions exhibit moderate to significant effects (ranging from 0.113 to 0.302), indicating that consumer behavior has a significant influence on SMEs' sustainability outcomes.

In contrast, the direct effects of GI on SBS dimensions are comparatively small (0.005–0.205), supporting the mediating importance of GCPB in the overall model.

Predictive relevance results, summarized in Table 3.8, confirm that the model demonstrates substantial out-of-sample predictive power. The Q^2 values exceed zero for all constructs (ranging from 0.250 to 0.533), confirming predictive relevance according to the Stone–Geisser criterion. The highest Q^2 scores were recorded for GCPB (0.533) and SBS_SCO (0.530), suggesting strong .

predictive capability for consumer behavior and social sustainability. The corresponding RMSE and MAE values (ranging from 0.495 to 0.880) fall within acceptable limits, further validating the model's predictive accuracy. Collectively, these results demonstrate that the structural model has strong explanatory power, meaningful effect sizes, and high predictive relevance, confirming the robustness of the hypothesized relationships among Green Innovation, Green Consumer Purchasing Behavior, and SMEs' business sustainability dimension

Table 3.6: R^2

	R-square	R-square adjusted
GCPB	0.542	0.539
SBS _ECO	0.337	0.328
SBS-ENV	0.443	0.435
SBS-SCO	0.636	0.631

sources: smart PLS.4.1.1.6

	f-square
GCPB -> SBS _ECO	0.113
GCPB -> SBS-ENV	0.302
GCPB -> SBS-SCO	0.258
GI -> GCPB	1.182
GI -> SBS _ECO	0.032
GI -> SBS-ENV	0.005
GI -> SBS-SCO	0.205

Table 3.7 F^2

sources: smart PLS.4.1.1.6

Table 3.8 Q^2 predict

	Q^2predict	RMSE	MAE
GCPB	0.533	0.697	0.552
SBS _ECO	0.250	0.880	0.692
SBS-ENV	0.262	0.875	0.678
SBS-SCO	0.530	0.698	0.495

sources: smart PLS.4.1.1.6

The structural path summarized in Table 3.9 demonstrates that most hypothesized relationships are statistically significant and in the expected direction. The path from Green Innovation (GI) → Green Consumer Purchasing Behavior (GCPB) shows a powerful and significant effect ($\beta = 0.736$, $t = 15.837$, $p < 0.001$*), confirming that environmentally oriented innovation initiatives by SMEs substantially influence consumers' green purchasing tendencies. Likewise, GCPB exerts significant positive effects on all three dimensions of SMEs' business sustainability: economic ($\beta = 0.404$, $p < 0.001$), environmental ($\beta = 0.606$, $p < 0.001$), and social ($\beta =$

0.452, p < 0.001). These results indicate that sustainability outcomes among Omani SMEs are strongly driven by environmentally conscious consumer behaviors that translate green innovation into tangible performance improvements.

Direct effects of GI on sustainability dimensions also reveal mixed but insightful patterns. GI significantly affects economic (β = 0.215, p = 0.047) and social sustainability (β = 0.403, p < 0.001), but its direct effect on environmental sustainability is insignificant (β = 0.078, p = 0.441). This finding suggests that while green innovation enhances operational efficiency and social reputation, its environmental benefits are realized primarily through consumer-driven mechanisms. Taken together, the results confirm both the direct influence of GI on selected sustainability dimensions and the mediating role of GCPB in transmitting these effects to broader sustainability outcomes. The significance of all main paths (except GI → SBS-ENV) and the high *t*-statistics provide strong empirical support for the hypothesized relationships, thereby validating the conceptual model linking Green Innovation, Green Consumer Purchasing Behavior, and SMEs' Business Sustainability in the Omani context

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Table 3.9 Path coefficients

	Original sample (O)	Sample mean (M)	Standard deviation (STDEV)	T statistics (|O/STDEV|)	P values
GCPB -> SBS _ECO	0.404	0.407	0.111	3.626	0.000
GCPB -> SBS-ENV	0.606	0.605	0.096	6.314	0.000
GCPB -> SBS-SCO	0.452	0.455	0.098	4.616	0.000
GI -> GCPB	0.736	0.737	0.046	15.837	0.000
GI -> SBS _ECO	0.215	0.216	0.108	1.986	0.047
GI -> SBS-ENV	0.078	0.080	0.102	0.770	0.441
GI -> SBS-SCO	0.403	0.405	0.097	4.156	0.000

sources: smart PLS.4.1.1.6

3.6 Hypothesis Testing and Mediation Analysis

The study proposed four hypotheses (H1–H4) to examine the direct and mediating relationships among Green Innovation (GI), Green Consumer Purchasing Behavior (GCPB), and SMEs' Business Sustainability (SBS). Table 8 summarizes the hypothesis testing results, while Figure 2 illustrates the significant and non-significant paths within the structural model.

H1 predicted that Green Innovation has a positive influence on SMEs' business sustainability. The results show that GI has significant direct effects on economic (β = 0.215, p = 0.047) and social (β = 0.403, p < 0.001) sustainability, but not on environmental sustainability (β = 0.078, p = 0.441). Hence, H1 is partially supported. This finding indicates that innovation efforts primarily enhance SMEs' financial performance and social responsibility, while environmental benefits depend on consumer response rather than internal processes alone.

H2 posited that Green Innovation positively affects Green Consumer Purchasing Behavior. This relationship is strongly supported (β = 0.736, t = 15.837, p < 0.001), confirming that eco-innovative SMEs encourage stronger consumer engagement in green purchasing. The result aligns with TPB theory, suggesting that innovation triggers favorable attitudes and perceived behavioral control among consumers, validating H2.

H3 proposed that Green Consumer Purchasing Behavior positively influences SMEs' business sustainability. The analysis reveals highly significant and positive effects across all three sustainability dimensions, economic (β = 0.404, p < 0.001), environmental (β = 0.606, p < 0.001), and social (β = 0.452, p < 0.001). Therefore, H3 is fully supported, indicating that environmentally conscious consumer behavior directly drives SME sustainability outcomes in Oman.

H4 examined the mediating role of Green Consumer Purchasing Behavior in the relationship between Green Innovation and SMEs' business sustainability. Bootstrapping results confirm that GCPB significantly mediates the effects of GI on all three sustainability dimensions. The indirect effects through GCPB are positive and significant for economic (β = 0.298, p < 0.001), environmental (β = 0.446, p < 0.001), and social (β = 0.333, p < 0.001) dimensions, while the direct effect of GI → SBS-ENV remains insignificant. These outcomes verify complete mediation for the environmental dimension and partial mediation for the economic and social dimensions. Thus, H4 is supported, emphasizing that GCPB acts as a behavioral bridge that translates innovation into sustainable performance.

In summary, three hypotheses (H2, H3, H4) are fully supported, and one (H1) is partially supported. The findings confirm that Green Innovation enhances SMEs' Sustainability both directly and indirectly through Green Consumer Purchasing Behavior, underscoring the theoretical integration of the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB). This dual-theory alignment validates that internal innovation capabilities (NRBV) combined with external behavioral mechanisms (TPB) create a robust pathway toward sustainable SME development in Oman. See Table 3.10 below

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Hypothesis	Path Relationship	β	t-value	p-value	Decision	Interpretation
H1a	GI → SBS_ECO	0.215	1.986	0.047	**Supported**	Green Innovation positively influences the economic sustainability of SMEs by improving cost efficiency and operational performance.
H1b	GI → SBS_ENV	0.078	0.770	0.441	**Not Supported**	The direct impact of Green Innovation on environmental sustainability is limited; environmental gains primarily arise through behavioral mechanisms.
H1c	GI → SBS_SCO	0.403	4.156	0.000	**Supported**	Green Innovation strengthens the social dimension of SMEs' sustainability through community engagement and social responsibility.
H2	GI → GCPB	0.736	15.837	0.000	**Supported**	Green Innovation significantly enhances Green Consumer Purchasing Behavior, validating the TPB assumption that innovation fosters pro-environmental intentions.

Hypothesis	Path Relationship	β	t-value	p-value	Decision	Interpretation
H3a	GCPB → SBS_ECO	0.404	3.626	0.000	**Supported**	Green Consumer Purchasing Behavior contributes positively to SMEs' economic sustainability outcomes.
H3b	GCPB → SBS_ENV	0.606	6.314	0.000	**Supported**	Green consumer purchasing behavior significantly improves environmental sustainability performance.
H3c	GCPB → SBS_SCO	0.452	4.616	0.000	**Supported**	Green purchasing behavior enhances the social responsibility and reputation aspects of SMEs' sustainability.
H4a–c	GI → GCPB → SBS (ECO / ENV / SCO)	0.298 / 0.446 / 0.333	—	<0.001	**Supported**	GCPB mediates the effect of Green Innovation on all sustainability dimensions—complete mediation for environmental, partial mediation for economic, and partial mediation for social.

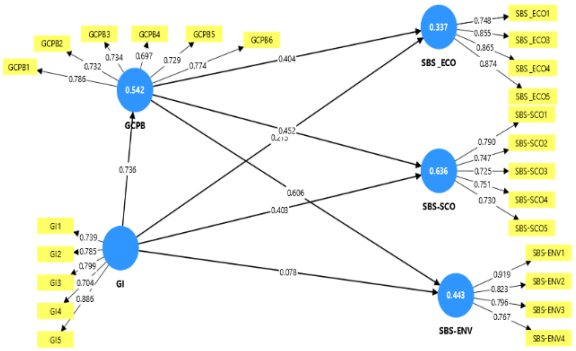
3.7 Measurement and Structural Model Results

The measurement model was first assessed to evaluate indicator reliability, internal consistency, convergent validity, and discriminant validity. As shown in Table 3.2, all outer loading values exceeded or closely approached the 0.70 threshold, indicating that the observed indicators reliably represent their respective constructs. The reliability and validity statistics presented in Table 3.3 further confirm the model's robustness, with Cronbach's alpha values ranging from 0.805 to 0.908 and composite reliability coefficients between 0.865 and 0.932, all of which exceed the minimum criterion of 0.70. Likewise, the average variance extracted (AVE) values, ranging from 0.551 to 0.734, surpass the 0.50 cutoff, confirming convergent validity (Hair et al., 2021).

Table 3.4 presents the discriminant validity, established through both the Heterotrait–Monotrait Ratio (HTMT) and the Fornell–Larcker criterion. All HTMT values were below 0.90, and the square roots of AVE values were greater than corresponding inter-construct correlations, confirming that each construct is empirically distinct. Collectively, these results confirm that the measurement model demonstrates high indicator reliability, internal consistency, and satisfactory convergent and discriminant validity, supporting its suitability for further structural analysis.

The structural model results are illustrated in Figure 1, and the coefficients are detailed in Tables 3.6–3.8. As indicated in Table 3.4, the R^2 values show substantial explanatory power across endogenous constructs: 0.542 for GCPB, 0.337 for SBS_ECO, 0.443 for SBS_ENV, and

0.636 for SBS_SCO, with adjusted R^2 values remaining consistent (0.328–0.631). These findings indicate that



Green Innovation (GI) and Green Consumer Purchasing Behavior (GCPB) together explain between 33% and 64% of the variance in the three dimensions of SME sustainability. The f^2 effect sizes in Table 3.7 further demonstrate that GI has a significant impact on GCPB (f^2 = 1.182), while GCPB exerts moderate to strong effects on sustainability outcomes (ranging from 0.113 to 0.302). In contrast, GI's direct influence on sustainability dimensions is negligible (0.005–0.205), highlighting the mediating importance of GCPB.

Predictive relevance results (Table 3.8) show Q^2 values above 0 for all constructs (0.250–0.533), confirming the model's strong predictive capability. The highest Q^2 scores were obtained for GCPB (0.533) and SBS_SCO (0.530), supported by acceptable RMSE and MAE values (0.495–0.880), which further validate out-of-sample predictive accuracy.

Path coefficient estimates and significance levels are presented in Table 3.9 and visualized in Figure 2. The results reveal that GI → GCPB is highly significant (β = 0.736, t = 15.837, $p < 0.001$), confirming that environmentally oriented innovation has a strong influence on consumers' green purchasing behavior. GCPB, in turn, significantly affects all three sustainability dimensions: economic (β = 0.404, $p < 0.001$), environmental (β = 0.606, $p < 0.001$), and social (β = 0.452, $p < 0.001$). This demonstrates that green purchasing behavior translates innovation into measurable sustainability outcomes. The direct paths from GI to sustainability are significant for economic (β = 0.215, p = 0.047) and social (β = 0.403, $p < 0.001$) dimensions, but not for environmental sustainability (β = 0.078, p = 0.441). These findings suggest that while GI enhances operational and social performance, its environmental impact is realized primarily through the mediating role of GCPB.

Overall, the combined evidence from Tables 3.2–3.9 and Figures 1–2 confirms that the proposed model exhibits strong reliability, validity, and predictive relevance, empirically supporting the hypothesized relationships. Green Innovation significantly influences SMEs' sustainability both directly and indirectly, with Green Consumer Purchasing Behavior emerging as a crucial mediator that links organizational innovation with broader sustainability outcomes within the Omani SME context.

Figure 1:

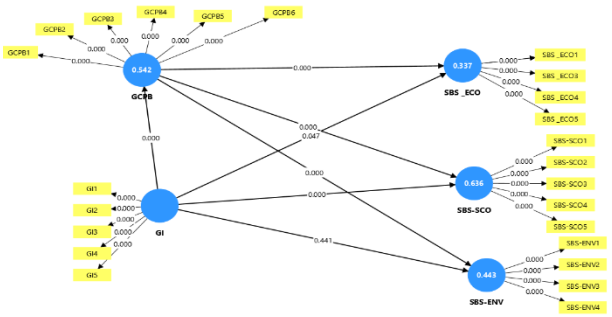


Figure 2:

source smart PLS4.1.1.6

4. Conclusions

This research investigated the effect of Green Innovation (GI) on SMEs' Business Sustainability (SBS) in the Sultanate of Oman, while examining the mediating role of Green Consumer Purchasing Behavior (GCPB) within an integrated theoretical model combining the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB). Using quantitative data collected from 150 small and medium-sized enterprises (SMEs) across multiple sectors, the study employed Partial Least Squares Structural Equation Modeling (PLS-SEM) through SmartPLS 4 to test the measurement and structural relationships among the constructs.

The results revealed that Green Innovation has a significant positive effect on the economic and social dimensions of business sustainability, confirming that eco-innovative SMEs in Oman achieve higher cost efficiency, improved stakeholder relations, and more substantial reputational advantages. However, the direct relationship between GI and environmental sustainability was found to be statistically insignificant, suggesting that technological and process innovations alone may not guarantee environmental performance improvements without complementary behavioral and market-driven mechanisms.

When the mediating role of GCPB was examined, the findings showed that GCPB fully mediates the relationship between GI and environmental sustainability and partially mediates the relationship between GI and both economic and social sustainability. This indicates that environmentally responsible consumer behavior is a powerful driver that translates internal innovation efforts into broader sustainability outcomes. In other words, while SMEs' innovation initiatives create eco-efficient products and processes, it is consumers' green purchasing decisions that enable those innovations to generate measurable environmental and social impact.

These findings provide strong empirical validation for integrating NRBV and TPB theories. The NRBV explains how green innovation acts as a strategic resource that builds competitiveness and operational efficiency. In contrast, the TPB clarifies how consumer attitudes, perceived control, and social norms transform these innovations into sustainable market outcomes. Together, these theoretical lenses demonstrate that sustainable

development depends on the interaction between firm-level capabilities and consumer-level behavioral intentions.

From a contextual perspective, the results align closely with Oman Vision 2040, which emphasizes innovation, environmental stewardship, and economic diversification as the foundations of long-term national prosperity. The evidence shows that supporting green innovation within SMEs, combined with stimulating consumer awareness and preference for sustainable products, can accelerate Oman's transition toward a knowledge-based, low-carbon economy. Thus, the study concludes that green innovation and green consumer purchasing behavior are mutually reinforcing levers for achieving sustainable competitiveness and national development objectives.

5. Specific Contributions, Limitations, and Future Directions

This study makes several significant theoretical and practical contributions to the growing body of knowledge on green innovation and sustainability within small and medium-sized enterprises (SMEs). Theoretically, it advances the literature by integrating two prominent perspectives the Natural Resource-Based View (NRBV) and the Theory of Planned Behavior (TPB) to create a comprehensive model that captures both organizational and behavioral determinants of sustainability. The NRBV explains how firms develop strategic environmental capabilities through resource-efficient innovations and eco-friendly production, while the TPB extends this understanding by showing how consumer attitudes, subjective norms, and perceived behavioral control influence the translation of these innovations into tangible market outcomes. By combining these frameworks, the research bridges the gap between internal innovation processes and external behavioral responses, emphasizing that sustainability is co-created by both firms and consumers. This dual-theory integration contributes conceptually to the sustainability literature, demonstrating that the effectiveness of green innovation in enhancing business sustainability depends not only on technological capabilities but also on how consumers perceive and respond to those innovations in the marketplace.

Another significant theoretical contribution of this research is the empirical validation of Green Consumer Purchasing Behavior (GCPB) as a key mediating mechanism linking Green Innovation (GI) and SMEs' Business Sustainability (SBS). Although previous studies have acknowledged that consumer behavior plays a role in sustainability, few have explicitly examined its mediating function in firm-level analyses, particularly in developing economies. The results of this study confirm that GCPB fully mediates the relationship between green innovation and environmental sustainability and partially mediates the link between green innovation and both economic and social sustainability. This finding highlights the behavioral pathway through which eco-innovations achieve impact, reinforcing the idea that the environmental and social benefits of innovation are realized most effectively when supported by consumer awareness and purchasing preferences. This study extends the boundary of traditional resource-based theories by incorporating behavioral dimensions that better reflect real-world market dynamics.

From a contextual standpoint, this research provides valuable empirical evidence from the Sultanate of Oman, an emerging economy within the Gulf Cooperation Council (GCC), where studies on SMEs, sustainability, and consumer-driven innovation remain limited. Focusing on the Omani SME sector, the study offers new regional insights into the global sustainability discourse and demonstrates how national strategies, such as Oman Vision 2040, can be effectively operationalized at the enterprise level. The evidence suggests that Omani SMEs are increasingly adopting environmentally responsible practices; however, their success in achieving sustainability depends heavily on the support and engagement of environmentally conscious consumers. This context-specific contribution is particularly relevant for policymakers and practitioners seeking to understand how cultural, institutional, and behavioral factors shape sustainability transitions in developing economies.

Practically, this study contributes actionable insights for both SME managers and policymakers. For managers, the results demonstrate that adopting green innovation practices yields tangible economic and social benefits, while enhancing competitiveness in the growing market for sustainable products. SMEs that integrate environmental values into their core operations, through efficient resource use, eco-design, and production transparency, can reduce operational costs and strengthen consumer trust and brand reputation. However, the study also reveals that innovation alone is insufficient; it must be accompanied by clear communication strategies that highlight environmental value and stimulate positive consumer attitudes. This emphasizes the importance of marketing and awareness-building in reinforcing the relationship between innovation and sustainability. For policymakers, the findings underscore the need to strengthen institutional frameworks that encourage eco-innovation through green financing schemes, tax incentives, and capacity-building programs. The results also suggest that consumer awareness campaigns and environmental labeling systems can further enhance GCPB, enabling a self-reinforcing cycle in which innovation and responsible consumption drive sustainable growth. In this sense, the research provides a practical roadmap for aligning SME practices with the pillars of innovation, environmental stewardship, and economic diversification outlined in Oman Vision 2040.

Despite these important contributions, several limitations must be acknowledged. First, the study was conducted with a sample of 150 SMEs in Oman, which, while adequate for Partial Least Squares Structural Equation Modeling (PLS-SEM), may not fully represent all sectors and regions of the country. Future research should expand the sample size and include a wider range of industries, such as tourism, construction, and renewable energy, to improve generalizability. Second, the research employed a cross-sectional design, capturing data at a single point in time. As a result, it cannot fully capture the dynamic nature of innovation adoption and behavioral change. Longitudinal studies could provide deeper insight into how green innovation and consumer behavior evolve and

how these interactions affect long-term sustainability performance. Third, because the study relied on self-reported data from SME managers, there is a possibility of response bias or socially desirable answers. Future research could triangulate findings by incorporating objective environmental performance data, third-party audits, or consumer surveys to validate results. Finally, the study focused exclusively on GCPB as a mediating variable; however, other potential mediators or moderators, such as green leadership, organizational culture, environmental ethics, or government regulation, may also influence the strength and direction of these relationships. Exploring these additional variables would enrich theoretical understanding and improve the predictive power of future models.

Looking forward, several avenues for further research emerge from this study. Future scholars could conduct comparative analyses across GCC countries to examine how cultural, regulatory, and institutional factors affect the relationships identified in this model. Additionally, mixed-methods approaches that combine quantitative analysis with qualitative interviews or case studies could provide richer insights into the managerial and consumer-level mechanisms driving sustainability outcomes. Investigating the role of digital technologies, such as artificial intelligence, blockchain, or big data, would also be valuable in supporting green innovation and promoting transparent consumer communication. Moreover, researchers could explore post-consumer behaviors such as product reuse, recycling, and waste minimization, which extend the sustainability impact beyond the point of purchase. These directions would help build a more holistic understanding of the nexus between innovation, behavior, and sustainability in emerging economies.

In conclusion, this study establishes a strong empirical foundation for understanding how green innovation and consumer behavior jointly contribute to SME sustainability in Oman. It demonstrates that sustainable development is not the result of isolated organizational action, but rather the outcome of an interactive process involving both innovative firms and conscious consumers. By confirming the mediating role of GCPB and validating the integration of NRBV and TPB, the research provides theoretical depth, contextual relevance, and practical direction for advancing green transformation among SMEs. The findings align with global sustainability frameworks and Oman Vision 2040, demonstrating that innovation-driven and behaviorally supported business models can play a transformative role in achieving the nation's goals for environmental protection, social welfare, and economic resilience. This study, therefore, contributes both academically and practically to the pursuit of sustainable enterprise development, offering a roadmap for policymakers, entrepreneurs, and researchers seeking to promote green growth in Oman and comparable emerging economies**.**

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