

Exploring Strategic Choices and Renewable Energy Adoption in Saudi Arabian SMEs:
The Mediating Role of Environmental Consciousness and Stakeholder Engagement

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<i>Article history:</i> <i>Received: July 2025</i> <i>Revised: August 2025</i> <i>Accepted: Sep 2025</i> <i>Available Online: Sep 2025</i>	Abstract This conceptual paper investigates the influence of strategic choices on the adoption of renewable energy by small and medium-sized enterprises (SMEs) in Saudi Arabia, with an emphasis on the mediating roles of environmental consciousness and stakeholder engagement. Against the backdrop of Vision 2030, renewable energy adoption is not just a national priority but a critical element in the global shift toward sustainability and economic diversification. In Saudi Arabia, where SMEs are pivotal contributors to the economy, their participation in this energy transition is paramount. However, research examining the interplay between strategic decision-making and renewable energy adoption in this sector remains sparse. This study proposes a conceptual framework to address the gap, exploring how strategic choices shape the integration of renewable energy and the roles that environmental consciousness and stakeholder engagement play in mediating this relationship. The framework integrates proactive entrepreneurial behavior, green innovation, and strategic leadership as key drivers of sustainability. By doing so, it offers policymakers, business leaders, and sustainability advocates practical insights into how SMEs can navigate the challenges of renewable energy adoption and leverage strategic choices for long-term competitiveness and environmental responsibility. The proposed framework also provides a foundation for future empirical research, highlighting the critical role of integrated strategies in achieving Saudi Arabia's sustainability goals under Vision 2030.
Keywords: Strategic Choices, Renewable Energy, Environmental Consciousness.	

1. Introduction

The global push for renewable energy has become an urgent imperative, driven by the growing recognition of the need to reduce carbon emissions, combat climate change, and transition to sustainable energy systems. As climate-related challenges intensify, governments and businesses are increasingly aligning their goals to support the shift from fossil fuels to renewable energy sources such as solar, wind, and bioenergy. In this context, Saudi Arabia, historically known for its oil-dependent economy, is charting a transformative course through its **Vision 2030** framework. Vision 2030 outlines a comprehensive plan to diversify the Saudi economy, reduce its dependency on oil revenues, and foster innovation and sustainability across key sectors. A cornerstone of this vision is the adoption of renewable energy, which is seen as vital to achieving both environmental sustainability and long-term economic resilience. By setting ambitious targets for renewable energy generation, Saudi Arabia aims to position itself as a global leader in the energy transition, with renewable energy projected to contribute

significantly to national energy output by 2030 (Owoseni, 2023).

Within this national strategy, small and medium-sized enterprises (SMEs) hold a critical role. SMEs form the backbone of the Saudi economy, contributing significantly to employment, innovation, and economic diversification. They are uniquely positioned to drive sustainable practices due to their agility, adaptability, and capacity for innovation. However, the adoption of renewable energy within the SME sector remains an underexplored area, both in practice and in research. Unlike larger corporations, which often have the financial and technical resources to invest in renewable energy technologies, SMEs face distinct challenges. These include limited access to capital, insufficient technological expertise, and regulatory hurdles, all of which hinder their ability to fully engage in the renewable energy transition (Alinda et al., 2024). Additionally, the strategic decision-making processes that SMEs employ in relation to renewable energy adoption are less understood, particularly in emerging markets like Saudi Arabia, where the dynamics of economic development, energy policy, and sustainability intersect in complex ways.

Given the pivotal role that SMEs play in advancing sustainability under Vision 2030, it is essential to explore how strategic choices made by SME leaders influence renewable energy adoption. Strategic decisions in SMEs encompass a wide range of factors, including market positioning, resource allocation, investment in innovation, and alignment with sustainability goals. In the context of renewable energy, these choices can determine whether an SME successfully integrates renewable energy technologies into its operations or continues to rely on traditional energy sources. Moreover, the success of these strategic choices is often mediated by two critical factors: environmental consciousness and stakeholder engagement. Environmental consciousness refers to the awareness and commitment of an organization to sustainability principles, which drives internal decisions towards adopting greener practices. Stakeholder engagement, on the other hand, involves the active involvement of key stakeholders such as customers, suppliers, investors, and government bodies in the decision-making process, ensuring that renewable energy initiatives are supported and aligned with external expectations (Babon-Ayeng et al., 2022). Both environmental consciousness and stakeholder engagement serve as vital mediators that can enhance the effectiveness of strategic choices, making them crucial elements in understanding how SMEs can successfully adopt renewable energy.

Despite the growing global emphasis on sustainability, there remains a significant gap in the literature regarding how strategic choices influence renewable energy adoption in SMEs. Most studies on renewable energy adoption focus on larger firms, which typically have more resources and are better equipped to handle the transition to green energy. This leaves a critical gap in understanding how smaller firms, particularly SMEs in emerging economies, navigate the challenges and opportunities of renewable energy adoption. SMEs often operate with constrained resources and face higher barriers to entry when it comes to investing in renewable energy technologies. Furthermore, while environmental consciousness and stakeholder engagement are recognized as important drivers of sustainability, their specific roles as mediators in the relationship between strategic choices and renewable energy adoption remain underexplored (Blasi et al., 2024). This is particularly true in the context of Saudi Arabia, where the SME

sector is expected to play a significant role in realizing the country's sustainability goals, but where little empirical research exists on how these firms approach renewable energy adoption.

This paper seeks to address these gaps by developing a conceptual framework that links strategic choices with renewable energy adoption in SMEs, with a focus on the mediating roles of environmental consciousness and stakeholder engagement. The proposed framework aims to provide a comprehensive understanding of how SMEs can integrate renewable energy into their strategic planning processes, thereby contributing to both national sustainability goals and the broader global energy transition. The primary research objectives are to: (1) explore how strategic decisions made by SMEs influence the adoption of renewable energy technologies; (2) examine how environmental consciousness within SMEs mediates the relationship between strategic choices and renewable energy adoption; and (3) investigate how stakeholder engagement enhances the effectiveness of strategic choices in driving renewable energy initiatives. To achieve these objectives, the study addresses the following key research questions:

1. How do strategic choices influence renewable energy adoption among SMEs in Saudi Arabia?
2. What role does environmental consciousness play in mediating the relationship between strategic choices and renewable energy adoption?
3. How does stakeholder engagement influence the success of strategic choices in promoting renewable energy adoption?

By answering these questions, this study aims to make a significant academic contribution to the literature on sustainability, strategic management, and renewable energy adoption in SMEs. Additionally, it offers practical insights for policymakers and business leaders seeking to promote renewable energy practices within the SME sector in Saudi Arabia and similar emerging economies. Understanding the interplay between strategic choices, environmental consciousness, and stakeholder engagement is crucial for designing effective policies and business strategies that support renewable energy adoption. For policymakers, the findings of this research could inform the development of targeted incentives and regulatory frameworks that encourage SMEs to invest in renewable energy technologies. For SME leaders, the study provides guidance on how to incorporate sustainability into their strategic decision-making processes, thereby aligning their businesses with both environmental goals and market opportunities (Celone et al., 2022).

2. Theoretical Foundations

2.1 Strategic Choices in SMEs

2.1.1 Overview of strategic decision-making and its role in SMEs:

Strategic decision-making in small and medium-sized enterprises (SMEs) is fundamental to their survival and competitiveness, particularly in fast-changing environments characterized by technological disruptions, evolving consumer preferences, and heightened regulatory demands. Unlike larger corporations, SMEs operate with more constrained resources, which means that every strategic choice

whether it pertains to market positioning, resource allocation, or innovation can significantly impact their sustainability and long-term success. These decisions are not only reactive to external pressures but also proactive, shaped by the vision and leadership of SME managers and owners who must navigate between immediate business needs and long-term growth objectives (Aldabbas & Oberholzer, 2024). The role of strategic decision-making in SMEs, particularly in the context of renewable energy adoption, cannot be overstated. As these enterprises are often more agile, their ability to make swift, innovative decisions positions them to seize opportunities in the renewable energy sector, contributing to both their competitive advantage and the broader sustainability goals of their respective economies (Alinda et al., 2024).

2.1.2 Proactive entrepreneurial behavior, green innovation, and strategic leadership:

A growing body of literature emphasizes that proactive entrepreneurial behavior within SMEs is a critical driver of sustainable practices and green innovation. Proactivity allows firms to anticipate future trends, such as the increasing demand for environmentally responsible products and services, and to develop strategic responses that enhance their market positioning. Entrepreneurs who are forward-thinking and sustainability-conscious tend to invest in green innovation, which involves the development and implementation of new products, services, and processes that minimize environmental impact. This type of innovation is crucial in transitioning SMEs from traditional business models to those that embrace renewable energy and sustainability (Alonso-Muñoz et al., 2023). Strategic leadership also plays an indispensable role in this transformation. Leaders who prioritize environmental sustainability embed green practices into their organizations by fostering a culture that encourages sustainability, innovation, and long-term thinking. These leaders influence not only the direction of the firm but also the attitudes and behaviors of employees, shaping the organizational ethos around environmental responsibility (Asumah et al., 2024).

2.2 Renewable Energy Adoption in SMEs

2.2.1 Trends and relevance to SMEs:

Renewable energy adoption is increasingly recognized as a strategic imperative for SMEs, offering significant benefits such as cost savings, enhanced operational efficiency, and improved corporate reputation. In addition to these business benefits, adopting renewable energy aligns SMEs with broader environmental goals, such as reducing carbon emissions and mitigating climate change. The transition from fossil fuels to renewable energy is particularly relevant in emerging economies like Saudi Arabia, where SMEs are pivotal in achieving national sustainability targets under frameworks such as Vision 2030 (Baiocco & Paniccia, 2023). Renewable energy adoption by SMEs is gaining traction globally, as governments offer incentives and subsidies that make technologies like solar power, wind energy, and bioenergy more accessible. However, the pace of adoption varies across sectors and regions, with some SMEs still facing significant challenges, including high upfront costs and technical barriers (Khafiso et al., 2024).

2.2.2 Challenges, opportunities, and technological innovations:

Despite the evident benefits of renewable energy adoption, SMEs encounter several challenges that hinder their ability to fully embrace these technologies. One of the most prominent barriers is the high capital investment required for renewable energy infrastructure, such as solar panels or wind turbines. Many SMEs struggle to secure financing for these investments due to limited access to financial markets, a challenge exacerbated by the relatively long payback periods of renewable energy projects (Mwenda et al., 2023). Moreover, the technical complexities involved in adopting and maintaining renewable energy systems require specialized knowledge that many SMEs lack. This creates additional hurdles, as firms must either invest in training or outsource expertise, both of which entail further costs. On the other hand, the landscape of renewable energy adoption is evolving, with technological innovations making it more feasible for SMEs to overcome these barriers. Advances in energy storage, decentralized energy systems, and smart grid technologies have reduced the costs and increased the efficiency of renewable energy solutions, offering SMEs new opportunities to integrate these technologies into their operations (Kartemo & Gonzalez-Perez, 2020). Additionally, regulatory frameworks and policy interventions, such as subsidies, tax incentives, and government-backed financing schemes, play a critical role in supporting SMEs' transition to renewable energy (Blasi et al., 2024).

2.3 Environmental Consciousness

2.3.1 Environmental psychology and its impact on corporate behavior:

Environmental consciousness within firms is a key factor influencing their commitment to sustainability. Rooted in environmental psychology, the concept of environmental consciousness refers to the awareness and concern for the natural environment that drives both individual and organizational behavior. In the corporate context, environmental consciousness manifests through policies, practices, and decision-making processes that prioritize environmental sustainability. Firms that cultivate a high level of environmental awareness are more likely to engage in proactive sustainability efforts, including the adoption of renewable energy technologies (Babon-Ayeng et al., 2022). Environmental psychology provides valuable insights into how awareness of environmental issues translates into organizational behavior. For instance, companies that integrate environmental consciousness into their strategic planning are more likely to implement energy-efficient practices, reduce waste, and adopt renewable energy solutions. These behaviors are driven by both internal motivations, such as ethical considerations and corporate values, and external pressures from regulatory agencies, consumers, and other stakeholders (León Bravo et al., 2021).

2.3.2 Role of environmental awareness in renewable energy adoption:

Environmental awareness plays a crucial role in shaping an organization's commitment to renewable energy. SMEs with a strong sense of environmental responsibility tend to view renewable energy not just as a cost-saving measure, but as a fundamental component of their sustainability strategy. This awareness encourages firms to invest in technologies that reduce their carbon footprint and enhance their sustainability performance. Research shows that firms with high levels of environmental consciousness are more likely to adopt renewable energy technologies as part of a broader effort to align their operations

with sustainability principles (Calza et al., 2023). In SMEs, this environmental awareness is often driven by the leadership's commitment to sustainability and reinforced by increasing consumer demand for environmentally friendly products and services, as well as stricter environmental regulations. The heightened focus on environmental awareness within SMEs thus creates a fertile ground for the adoption of renewable energy, positioning these firms as key players in the global energy transition (Paiva et al., 2024).

2.4 Stakeholder Engagement

2.4.1 Stakeholder theory and its relevance to sustainability in SMEs:

Stakeholder theory underscores the importance of considering the needs and interests of all parties affected by a firm's decisions ranging from employees, customers, and suppliers to investors, government bodies, and the broader community. This theory is particularly relevant in the context of sustainability, as the successful implementation of environmental initiatives, including renewable energy adoption, often requires the support and engagement of multiple stakeholders (Arena et al., 2022). For SMEs, stakeholder engagement is not only a strategy for enhancing corporate social responsibility but also a practical approach to building the trust and legitimacy needed to implement sustainability practices. The close-knit relationships SMEs typically have with their stakeholders, especially within local communities, make stakeholder engagement a vital tool for driving renewable energy adoption and ensuring that these efforts are aligned with stakeholder expectations (Rossolini et al., 2021).

2.4.2 Influence of stakeholder involvement on renewable energy adoption:

Engaging stakeholders in the decision-making process is essential for the successful adoption of renewable energy in SMEs. Key stakeholders, such as customers, suppliers, and government bodies, can influence the direction and success of renewable energy initiatives in various ways. For example, customers who value sustainability may push SMEs to adopt greener practices, while suppliers can provide access to renewable technologies and eco-friendly materials. Government agencies, through policy frameworks and financial incentives, can also play a critical role in supporting SMEs' renewable energy projects (Piwowar-Sulej et al., 2024). Moreover, stakeholder engagement fosters collaboration and knowledge-sharing, which helps SMEs navigate the technical and financial challenges associated with renewable energy adoption. Research shows that SMEs that actively involve stakeholders in their sustainability efforts are more likely to succeed in adopting renewable energy solutions, as these stakeholders provide valuable insights, resources, and support throughout the implementation process (Osarenkhoe & Fjellström, 2024).

2.5 Mediation Role of Environmental Consciousness and Stakeholder Engagement

2.5.1 How environmental consciousness and stakeholder engagement mediate the strategic choices-renewable energy adoption relationship:

Both environmental consciousness and stakeholder engagement play crucial mediating roles in the relationship between strategic choices and renewable energy adoption in SMEs. Environmental consciousness serves as an internal driver, translating strategic decisions into sustainable actions by

fostering a culture of environmental responsibility within the organization. When SMEs prioritize sustainability in their strategic planning, they are more likely to adopt renewable energy technologies, as these choices align with the firm's commitment to reducing its environmental impact (Esposito et al., 2021). In this sense, environmental consciousness acts as a bridge between strategic choices and renewable energy adoption, ensuring that sustainability is embedded in the firm's decision-making processes.

Similarly, stakeholder engagement acts as an external mediator by ensuring that renewable energy initiatives are supported by key stakeholders. Effective engagement with stakeholders creates a collaborative environment that enhances the implementation and success of renewable energy projects. Research indicates that stakeholder involvement not only helps SMEs secure the necessary resources and expertise for renewable energy adoption but also enhances the legitimacy and acceptance of these initiatives (Mwenda et al., 2023). By aligning their strategic choices with the expectations of stakeholders, SMEs can build the trust and support needed to drive renewable energy adoption.

2.5.2 Interaction between strategic choices, environmental factors, and stakeholder engagement:

The interaction between strategic choices, environmental consciousness, and stakeholder engagement creates a synergistic framework that fosters renewable energy adoption in SMEs. Strategic decisions that emphasize sustainability set the stage for increased environmental awareness, which in turn encourages the adoption of green technologies. At the same time, engaging stakeholders ensures that these sustainability initiatives are aligned with external expectations and supported by the necessary resources. Together, environmental consciousness and stakeholder engagement act as reinforcing mechanisms that enhance the effectiveness of strategic choices, enabling SMEs to overcome barriers and achieve long-term sustainability goals (Baiocco & Paniccia, 2023).

3. Hypotheses Development

3.1 Hypotheses on Strategic Choices and Renewable Energy Adoption

H1: Strategic choices positively influence renewable energy adoption in SMEs.

Strategic choices made by small and medium-sized enterprises (SMEs) significantly impact their capacity to adopt renewable energy. The strategic decision-making process within SMEs is influenced by several factors, including the firm's long-term objectives, market positioning, and the regulatory environment. Strategic leadership, particularly the emphasis on sustainability, shapes how SMEs allocate resources toward renewable energy initiatives. Research has consistently demonstrated that firms adopting proactive, sustainability-driven strategies are more likely to implement renewable energy solutions, such as solar panels or wind turbines, as part of their operational framework (Aldabbas & Oberholzer, 2024). SMEs that strategically prioritize green innovation and environmental sustainability gain a competitive edge by aligning their operations with global trends towards decarbonization and sustainable energy use (Barrett et al., 2024). Furthermore, strategic choices that prioritize long-term environmental goals over short-term financial gains foster a corporate culture that encourages the adoption of renewable energy

technologies (Alinda et al., 2024). In this context, it is hypothesized that strategic decisions made by SMEs have a direct, positive influence on the adoption of renewable energy, reflecting the importance of forward-thinking leadership and proactive entrepreneurship in driving sustainability efforts.

3.2 Hypotheses on the Mediating Role of Environmental Consciousness

H2: Environmental consciousness positively mediates the relationship between strategic choices and renewable energy adoption.

Environmental consciousness within an organization refers to the awareness and commitment to minimizing environmental impact and adopting sustainable practices. This internal orientation towards environmental responsibility often results from strategic choices that prioritize sustainability. In SMEs, environmental consciousness influences not only day-to-day operations but also long-term investment decisions, including the adoption of renewable energy technologies (Alonso-Muñoz et al., 2023). Firms that foster environmental awareness are more likely to implement renewable energy solutions as part of their broader sustainability goals. This is because environmental consciousness creates a cultural and ethical framework that aligns the firm's strategic decisions with its environmental objectives (León Bravo et al., 2021). In this mediating role, environmental consciousness translates strategic choices into concrete actions that support renewable energy adoption, thereby bridging the gap between abstract sustainability goals and their practical implementation (Esposito et al., 2021). SMEs that nurture a culture of environmental responsibility are more likely to see successful outcomes from their renewable energy investments, as this consciousness reinforces the alignment of strategic goals with operational practices. Thus, it is hypothesized that environmental consciousness positively mediates the relationship between strategic choices and renewable energy adoption.

3.3 Hypotheses on the Mediating Role of Stakeholder Engagement

H3: Stakeholder engagement positively mediates the relationship between strategic choices and renewable energy adoption.

Stakeholder engagement plays a critical role in the successful implementation of renewable energy initiatives within SMEs. Engaging stakeholders such as customers, suppliers, employees, and government entities ensures that sustainability efforts, including renewable energy adoption, receive the necessary support, resources, and legitimacy. Strategic decisions that emphasize stakeholder engagement foster collaboration, transparency, and trust, all of which are crucial for overcoming the challenges associated with renewable energy projects (Babon-Ayeng et al., 2022). For example, engaging with customers who prioritize sustainability can create market incentives for SMEs to adopt renewable energy technologies, while collaboration with suppliers can facilitate access to eco-friendly materials and services (Piwowar-Sulej et al., 2024). Additionally, government stakeholders, through regulatory frameworks and incentives, can provide financial and technical support, enabling SMEs to navigate the high costs and complexities of renewable energy adoption (Mwenda et al., 2023). By involving stakeholders in their strategic decision-making processes, SMEs enhance the feasibility and success of their renewable energy initiatives. Therefore, it is hypothesized that stakeholder engagement positively

mediates the relationship between strategic choices and renewable energy adoption, enabling SMEs to harness external support and resources that drive their sustainability goals.

3.4 Joint Mediation Hypotheses

H4: Both environmental consciousness and stakeholder engagement jointly mediate the relationship between strategic choices and renewable energy adoption in SMEs.

The combination of environmental consciousness and stakeholder engagement is hypothesized to jointly mediate the relationship between strategic choices and renewable energy adoption in SMEs. While environmental consciousness fosters an internal commitment to sustainability, stakeholder engagement ensures that these efforts receive external validation and support. Together, these factors create a comprehensive framework that enhances the effectiveness of strategic choices in promoting renewable energy initiatives (Asumah et al., 2024). Environmental consciousness encourages SMEs to integrate renewable energy into their operations by aligning their strategic decisions with environmental objectives, while stakeholder engagement facilitates collaboration with key external actors, such as customers, suppliers, and government agencies, who provide the necessary resources and legitimacy for these initiatives (Osarenkhoe & Fjellström, 2024). This dual mediation mechanism ensures that strategic decisions are not only environmentally responsible but also practically feasible and widely accepted. By fostering both internal and external alignment with sustainability goals, SMEs can achieve more successful outcomes in renewable energy adoption, positioning themselves as leaders in the transition towards sustainable energy practices (Piantoni et al., 2024). Therefore, it is hypothesized that environmental consciousness and stakeholder engagement jointly mediate the relationship between strategic choices and renewable energy adoption, creating a synergistic effect that amplifies the impact of these strategic decisions on sustainability outcomes.

4. Gap in the Literature

4.1 Strategic Choices in Renewable Energy Adoption

While the existing literature has extensively covered sustainability and renewable energy practices, there is a noticeable gap in understanding the specific role of strategic choices in promoting renewable energy adoption, particularly within small and medium-sized enterprises (SMEs). Much of the research on sustainability tends to focus on larger corporations, which have greater resources and capabilities to implement renewable energy solutions on a significant scale. These larger firms benefit from economies of scale, more accessible funding, and established infrastructures for sustainable development. SMEs, however, operate with limited resources and often face unique strategic challenges that are not fully addressed by current literature. Studies tend to overlook how the specific strategic decisions made by SMEs such as resource allocation, innovation, and long-term planning can facilitate or hinder renewable energy adoption (Kaartemo & Gonzalez-Perez, 2020). The gap in the literature regarding SMEs' strategic choices is critical because these firms make up a significant portion of the global economy and, in regions like Saudi Arabia, are pivotal to economic diversification and sustainable development under frameworks

like Vision 2030 (Aldabbas & Oberholzer, 2024). The absence of detailed research on how SMEs can strategically navigate renewable energy adoption points to a significant research opportunity, as understanding the decision-making processes in these firms could help accelerate the transition to greener energy sources at a broader level.

4.2 Environmental Consciousness and Stakeholder Engagement

Another significant gap in the literature lies in the integration of environmental consciousness and stakeholder engagement as mediating factors in the process of renewable energy adoption. While both concepts are widely acknowledged as essential components of corporate sustainability, few studies have examined how they specifically mediate the relationship between strategic choices and renewable energy initiatives, particularly in the SME context. Environmental consciousness the internal awareness and commitment to reducing environmental impact is often addressed in isolation, with little attention given to how it interacts with strategic decision-making processes (Alinda et al., 2024). Similarly, stakeholder engagement is frequently discussed within the broader context of corporate social responsibility (CSR) but lacks a focused exploration of its role as a mediator that could bridge the gap between strategic choices and renewable energy outcomes. SMEs, in particular, have strong local connections and depend on stakeholder collaboration whether with suppliers, customers, or regulatory bodies to overcome resource constraints and implement renewable energy solutions (Piwowar-Sulej et al., 2024). However, there is limited empirical research that examines how these two factors, environmental consciousness and stakeholder engagement, work together to influence renewable energy adoption. The literature often treats them as separate elements, failing to capture the dynamic interaction between internal environmental commitment and external stakeholder pressures in shaping sustainable energy decisions. Addressing this gap would provide a more comprehensive understanding of how SMEs can integrate these mediating factors into their strategic frameworks to enhance their sustainability efforts.

4.3 Sector-Specific Studies in Saudi Arabia

The specific context of Saudi Arabia, particularly in relation to Vision 2030, presents another critical gap in the literature. While renewable energy adoption is a key pillar of the country's strategic vision for economic diversification and environmental sustainability, there is a noticeable lack of research focusing on how SMEs in Saudi Arabia are engaging with these energy transitions. Most existing studies in the region focus on large-scale energy projects or government-led initiatives, leaving the SME sector underexplored (Baiocco & Paniccia, 2023). This gap is particularly problematic because SMEs represent a substantial part of Saudi Arabia's economy and are central to achieving the goals of Vision 2030. Despite their economic significance, SMEs face unique challenges in adopting renewable energy, such as limited access to financial resources, technological barriers, and regulatory hurdles (Mwenda et al., 2023). The absence of sector-specific studies on how Saudi Arabian SMEs are addressing these challenges leaves policymakers and business leaders with limited insights into the specific needs and opportunities within this crucial sector. Furthermore, existing research does not sufficiently examine how local cultural, economic, and regulatory factors influence the strategic choices SMEs make regarding

renewable energy adoption. Given the Saudi government's strong push towards sustainable energy, this gap in the literature highlights the need for focused research that addresses the unique dynamics of SMEs in this region and provides actionable insights for accelerating renewable energy adoption in line with Vision 2030.

4.4 Lack of Comprehensive Conceptual Frameworks

Finally, the literature suffers from a lack of comprehensive conceptual frameworks that integrate strategic choices, environmental consciousness, and stakeholder engagement in promoting renewable energy adoption within SMEs. Current studies often focus on these elements in isolation, examining either the strategic decisions of firms, their environmental awareness, or their engagement with stakeholders, without fully considering how these factors interact in the specific context of renewable energy adoption (Alonso-Muñoz et al., 2023). This siloed approach fails to capture the complexity of decision-making in SMEs, where limited resources require a more integrated approach to sustainability. SMEs, in particular, benefit from frameworks that not only address their strategic decision-making processes but also account for the mediating role of environmental and stakeholder factors in ensuring the success of renewable energy initiatives (Celone et al., 2022). The development of a holistic conceptual framework that connects these elements is essential for understanding how SMEs can effectively implement renewable energy solutions. Such a framework would provide a valuable tool for both researchers and practitioners, offering a structured approach to analyzing the multifaceted challenges SMEs face in their sustainability journeys. The lack of such comprehensive frameworks represents a significant gap, as without this integration, it is difficult to fully understand the pathways through which strategic choices are translated into tangible sustainability outcomes, particularly in the complex and resource-constrained environment of SMEs (Asumah et al., 2024).

5. Conceptual Framework Development

5.1 Strategic Choices and Renewable Energy Adoption

The role of strategic choices in shaping renewable energy adoption within SMEs cannot be understated. Strategic leadership, proactive entrepreneurship, and innovation-driven strategies are key drivers of renewable energy initiatives. Leadership is particularly important in setting the tone for sustainability efforts. Leaders who prioritize green innovation and sustainability are more likely to steer their organizations towards adopting renewable energy technologies, such as solar panels, wind turbines, or bioenergy systems (Baiocco & Paniccia, 2023). These strategic choices help SMEs transition from fossil fuel dependency to more sustainable energy sources, contributing to both environmental and economic goals.

Proactive entrepreneurship, defined as the forward-thinking and opportunity-seeking behavior of business leaders, is another crucial factor in renewable energy adoption. Entrepreneurs who are keenly aware of the potential for renewable energy to provide both competitive and environmental advantages are more likely to embed these solutions into their business models. By identifying and capitalizing on

opportunities in the renewable energy sector, proactive entrepreneurs can drive the adoption of innovative energy solutions that enhance operational efficiency, reduce costs, and align the firm with broader sustainability goals (Khafiso et al., 2024). This proactive approach to sustainability also positions SMEs as leaders in the transition to greener practices, fostering long-term competitiveness and resilience in a rapidly evolving market.

5.2 Environmental Consciousness as a Mediator

Environmental consciousness serves as a key mediator in the relationship between strategic choices and renewable energy adoption. It reflects an SME's internal commitment to sustainability, characterized by an awareness of environmental impacts and a proactive approach to minimizing these effects. Firms with higher levels of environmental consciousness are more likely to align their strategic choices with sustainability objectives, making renewable energy adoption a natural extension of their broader environmental goals (Alonso-Muñoz et al., 2023). Environmental consciousness shapes organizational culture, influencing both leadership and employee behavior toward sustainability practices, and acts as a driving force behind decisions to invest in renewable energy technologies.

In the context of this framework, environmental consciousness bridges the gap between strategic intent and implementation by ensuring that sustainability is embedded in the firm's daily operations. SMEs that cultivate a strong sense of environmental responsibility are more likely to adopt renewable energy solutions not only as a cost-saving measure but as a reflection of their long-term commitment to sustainability (Calza et al., 2023). Furthermore, environmentally conscious firms often engage in practices such as energy-efficient operations, waste reduction, and carbon footprint minimization, which reinforce their decision to adopt renewable energy as part of a holistic sustainability strategy.

5.3 Stakeholder Engagement as a Mediator

Stakeholder engagement plays an equally important mediating role in the framework, influencing how SMEs navigate the complexities of renewable energy adoption. Engaging key stakeholders, such as customers, suppliers, and government bodies, is critical for ensuring the success of renewable energy initiatives. Through active engagement, SMEs can gather valuable insights into market trends, regulatory requirements, and technological innovations, all of which inform their strategic decisions related to renewable energy (Piwowar-Sulej et al., 2024). Moreover, by fostering collaboration with stakeholders, SMEs can secure the necessary support, resources, and legitimacy to implement renewable energy projects successfully.

The role of stakeholder engagement in promoting sustainability is multifaceted. For instance, involving customers who prioritize eco-friendly products and services can create market pressure for SMEs to adopt renewable energy solutions (Rossolini et al., 2021). Similarly, collaboration with suppliers can facilitate access to sustainable materials and technologies that enable renewable energy adoption. Government stakeholders, on the other hand, play a crucial role by providing regulatory frameworks, incentives, and financial support that lower the barriers to renewable energy investments (Osarenkhoe & Fjellström, 2024). Thus, stakeholder engagement acts as a catalyst that not only facilitates the adoption of renewable

energy but also aligns the firm's strategic choices with broader societal and environmental goals.

5.4 Interaction of Environmental Consciousness, Stakeholder Engagement, and Strategic Choices

The interaction between strategic choices, environmental consciousness, and stakeholder engagement creates a dynamic framework for understanding renewable energy adoption in SMEs. The proposed framework suggests that the success of renewable energy initiatives is contingent upon the joint mediation of environmental consciousness and stakeholder engagement, both of which reinforce the effectiveness of strategic choices. Environmental consciousness drives internal commitment to sustainability, while stakeholder engagement ensures external collaboration and support, creating a synergistic effect that enhances the likelihood of successful renewable energy adoption (Blasi et al., 2024).

This interaction reflects the holistic nature of sustainability in SMEs. Strategic decisions related to renewable energy are not made in isolation but are influenced by both internal environmental values and external stakeholder expectations. SMEs that effectively integrate these mediating factors into their strategic planning are better positioned to overcome the financial, technical, and regulatory challenges associated with renewable energy adoption. The framework emphasizes that the alignment of strategic choices with environmental consciousness and stakeholder engagement creates a feedback loop that fosters continuous improvement in sustainability practices. As SMEs become more environmentally aware and engage more deeply with their stakeholders, they are more likely to make strategic decisions that prioritize renewable energy, leading to long-term business sustainability and environmental stewardship (Mwenda et al., 2023).

5.5 Proposed Framework

The proposed conceptual framework integrates strategic choices, renewable energy adoption, environmental consciousness, and stakeholder engagement to offer a comprehensive understanding of how small and medium-sized enterprises (SMEs) can drive sustainability initiatives through renewable energy. The framework posits that strategic choices made by SMEs significantly influence their adoption of renewable energy technologies and practices, with environmental consciousness and stakeholder engagement acting as mediating factors. SMEs, particularly in resource-constrained environments like Saudi Arabia, face unique challenges in balancing short-term operational demands with long-term sustainability goals. This framework emphasizes that SMEs must not only make strategic decisions aligned with sustainability objectives but also cultivate an internal culture of environmental awareness and foster external collaboration through stakeholder engagement to ensure the success of renewable energy initiatives (Barrett et al., 2024).

In this model, strategic choices serve as the foundation for renewable energy initiatives. These decisions include resource allocation, investments in green innovation, and leadership commitment to sustainability, all of which can directly impact renewable energy adoption. However, the framework highlights that the effectiveness of these strategic choices is significantly enhanced when mediated by environmental consciousness, which influences internal attitudes and behaviors towards sustainability,

and stakeholder engagement, which ensures external support and collaboration (Alinda et al., 2024). Together, these mediators help bridge the gap between strategy and execution, enabling SMEs to overcome barriers such as limited resources, regulatory constraints, and technical challenges.

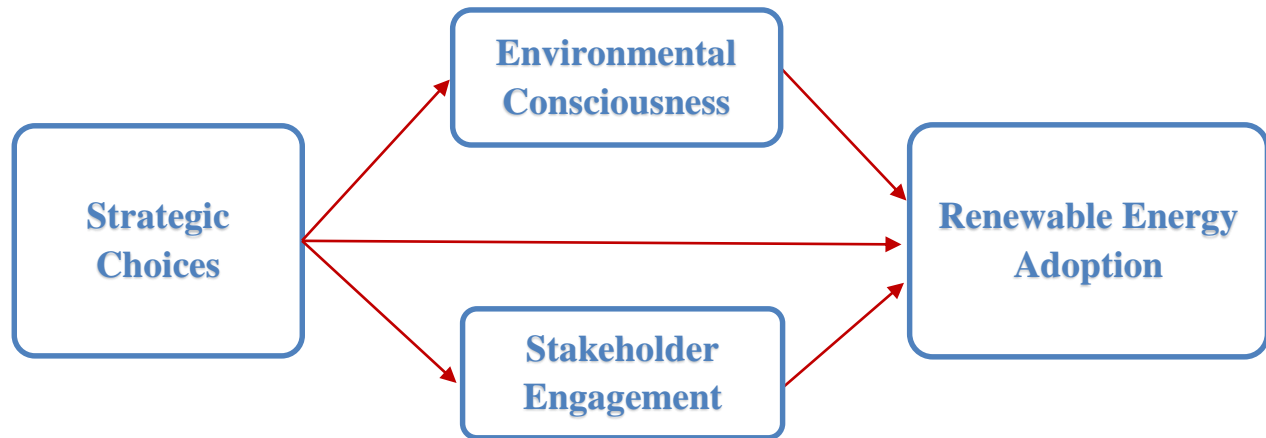


Fig. 1: Research Conceptual Framework

6. Practical Implications

6.1 For Policymakers

Policymakers play a pivotal role in shaping the environment in which SMEs operate, particularly concerning renewable energy adoption. To foster renewable energy uptake in SMEs, policymakers must create supportive regulatory frameworks that promote sustainability through strategic decision-making. By implementing clear policies and establishing ambitious renewable energy targets, governments can provide a roadmap for SMEs to align their strategies with national and global sustainability goals. For instance, Saudi Arabia's Vision 2030 emphasizes economic diversification and environmental sustainability, offering a unique opportunity for policymakers to develop comprehensive policies that encourage SMEs to transition toward renewable energy (Owoseni, 2023).

A critical area where government intervention can make a significant impact is in providing financial incentives and regulatory support to reduce the cost burden of renewable energy technologies. High upfront costs are a major barrier for SMEs considering renewable energy adoption. Therefore, offering subsidies, tax incentives, and low-interest loans specifically tailored for SMEs could lower these barriers and make renewable energy adoption more financially viable (Kaartemo & Gonzalez-Perez, 2020). Additionally, creating green bonds or other financing mechanisms targeted at SMEs can facilitate access to capital for renewable energy investments. Governments can also establish public-private partnerships to share the risks and rewards associated with renewable energy projects, thereby encouraging more SMEs to participate in sustainability efforts.

Beyond financial incentives, regulatory measures such as setting minimum energy efficiency standards or mandating renewable energy usage for certain sectors can accelerate the adoption of clean energy technologies. Policymakers should also consider streamlining the regulatory processes for SMEs,

reducing bureaucratic red tape that may hinder smaller firms from accessing renewable energy markets. Training and capacity-building initiatives should be implemented to enhance SMEs' understanding of renewable energy technologies and their long-term benefits. By offering educational programs and resources, policymakers can equip SMEs with the skills and knowledge needed to effectively integrate renewable energy into their strategic plans (Aldabbas & Oberholzer, 2024).

6.2 For SMEs and Business Leaders

SMEs and business leaders must take an active role in advancing renewable energy adoption by incorporating sustainability into their core strategic decision-making processes. A key practical guideline for SMEs is to embed environmental awareness into their organizational culture, ensuring that sustainability becomes a fundamental part of their business model. This can be achieved by setting clear sustainability goals, conducting environmental impact assessments, and integrating environmental consciousness into the company's long-term strategic vision (Alinda et al., 2024). Leaders who champion sustainability within their organizations foster a culture of innovation and proactive entrepreneurship, positioning their SMEs as leaders in renewable energy adoption.

For SMEs, the adoption of renewable energy can provide a competitive edge by reducing operational costs and improving resource efficiency. For instance, investing in solar panels or energy-efficient technologies can significantly lower energy expenses, which, in turn, enhances profitability (Barrett et al., 2024). Additionally, adopting renewable energy allows SMEs to differentiate themselves in the marketplace by appealing to environmentally conscious consumers and investors, thus improving their corporate reputation. By prioritizing renewable energy adoption in their strategic planning, SMEs can align themselves with broader societal and environmental objectives, which increasingly influence consumer behavior and investor preferences (Calza et al., 2023).

SMEs should also focus on building stronger relationships with key stakeholders, such as customers, suppliers, and regulatory bodies, to enhance the effectiveness of their renewable energy initiatives. Engaging stakeholders through transparent communication and collaboration ensures that renewable energy projects receive the necessary support and resources to succeed. For example, partnering with suppliers who share similar sustainability goals can lead to the development of greener supply chains, while collaborating with local governments can provide access to grants or technical assistance programs designed to support renewable energy adoption (Osarenkhoe & Fjellström, 2024). Business leaders should leverage these relationships to co-create sustainable solutions, driving innovation and accelerating the transition to renewable energy.

6.3 For Sustainability Advocates

Sustainability advocates are crucial in promoting environmental consciousness and stakeholder engagement within SMEs to enhance renewable energy initiatives. Advocacy groups and environmental organizations can play a pivotal role by raising awareness about the long-term benefits of renewable energy, not only in terms of cost savings but also in terms of reducing carbon footprints and promoting corporate social responsibility (Esposito et al., 2021). By organizing campaigns and educational

programs, sustainability advocates can encourage SMEs to integrate renewable energy into their strategic choices and make informed decisions that align with sustainability goals.

Sustainability advocates can also foster greater collaboration between SMEs, governments, and other stakeholders to create a supportive ecosystem for renewable energy adoption. Facilitating dialogues and partnerships between various stakeholders allows SMEs to access the resources, knowledge, and networks needed to implement renewable energy projects effectively (De Gennaro et al., 2023). Advocates can help bridge the gap between SMEs and government agencies by ensuring that businesses are aware of available incentives, subsidies, and technical support for renewable energy adoption. Moreover, by promoting best practices and success stories, advocates can inspire other SMEs to follow suit and embrace renewable energy solutions as part of their broader sustainability strategies.

In addition to advocating for policy changes, sustainability advocates can encourage industry collaboration to overcome shared challenges related to renewable energy adoption. For instance, forming industry alliances or coalitions that promote renewable energy use within specific sectors can accelerate the development and implementation of innovative energy solutions tailored to the needs of SMEs. By championing these collaborative efforts, advocates can create momentum for wider industry adoption of renewable energy practices, driving systemic change across the SME landscape (Arena et al., 2022).

7. Conclusion

This paper presents a comprehensive exploration of the crucial role that strategic choices play in fostering renewable energy adoption among small and medium-sized enterprises (SMEs), particularly within the context of Saudi Arabia's Vision 2030. By integrating the mediating factors of environmental consciousness and stakeholder engagement, the proposed conceptual framework offers a nuanced understanding of how SMEs can leverage strategic leadership, proactive entrepreneurship, and sustainability-driven decision-making to adopt renewable energy practices. The model underscores that strategic choices alone are not enough; the presence of a sustainability-oriented culture and the active involvement of stakeholders are key in translating these decisions into effective renewable energy initiatives. The theoretical foundation provided fills a notable gap in the literature, where limited attention has been given to the interplay between strategy, environmental awareness, and stakeholder involvement in the context of renewable energy adoption within SMEs. Furthermore, this paper highlights the significance of aligning strategic decisions with broader sustainability goals, demonstrating that SMEs have the potential to not only reduce operational costs but also enhance their market competitiveness and reputation through renewable energy adoption. The conceptual framework developed here serves as a basis for future empirical research, with practical implications for policymakers, business leaders, and sustainability advocates seeking to promote the integration of renewable energy in the SME sector. The paper also contributes to the ongoing academic discourse on how SMEs can act as key players in advancing national and global sustainability agendas, especially in emerging economies like Saudi Arabia.

Despite its contributions, this study has several limitations. Being a conceptual paper, the proposed

framework requires empirical validation to assess the strength of the relationships posited. The reliance on theoretical constructs means that further testing through real-world applications is essential to confirm the model's applicability and robustness. One limitation is the absence of cross-industry analysis, which would provide a more holistic view of how strategic choices and renewable energy adoption manifest in various sectors. Furthermore, the context-specific focus on Saudi Arabian SMEs limits the generalizability of the findings to other geographic regions. Future research could explore these dynamics across different sectors and regions, particularly through longitudinal studies that capture the evolution of renewable energy adoption in SMEs over time. Moreover, additional factors, such as organizational culture, technological readiness, or financial performance, could be examined to expand the framework and deepen our understanding of what drives successful renewable energy initiatives in SMEs. Empirical investigations could also explore the role of external environmental pressures, such as regulatory shifts or market demand, in accelerating the adoption of sustainable energy solutions. By addressing these limitations, future studies can further refine and validate the framework, offering greater insights into the strategic mechanisms that underpin renewable energy adoption within SMEs.

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