

## UNPACKING THE MECHANISMS CONNECTING SUSTAINABLE LEADERSHIP TO GREEN INNOVATION PERFORMANCE IN TOURISM AND HOSPITALITY: THE ROLES OF GREEN ABSORPTIVE CAPABILITY, ENTREPRENEURIAL ORIENTATION, AND ORGANIZATIONAL IDENTITY

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**Abstract:** The purpose of this study is to investigate the impact of sustainable leadership (SL) on green innovation performance (GIP) in the tourism and hospitality sectors, focusing on the mediating roles of green absorptive capability (GAC), green entrepreneurial orientation (GEO), and green organizational identity (GOI). Using judgmental and convenience sampling, 320 responses from mid-level management at five-star hotels and category-A travel agencies in Egypt were analyzed using PLS-SEM with WarpPLS statistical software 7.0. Findings show that SL positively affects GIP, GAC, GEO, and GOI. In addition, GIP is positively affected by GAC, GEO, and GOI. Furthermore, the study found that GAC, GEO, and GOI significantly mediate SL→GIP relationship. Theoretically, the study offers fresh insights into how emerging concepts like SL, GAC, GEO, and GOI predict GIP in tourism and hospitality enterprises. Theoretically, the study also enhances our comprehension of the Diffusion of Innovation Theory. The study emphasizes the significance of fostering a culture of continuous learning in tourism and hospitality organizations, encouraging employees to adopt sustainable practices and innovations.

**Keywords:** sustainable leadership, green innovation performance, green absorptive capability, green entrepreneurial orientation, green organizational identity, tourism and hotel enterprises

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### INTRODUCTION

Sustainable leadership reflects the growing need for leaders who ensure organizational longevity while addressing environmental and societal responsibilities (Hargreaves & Fink, 2012; Al-Romeedy et al., 2025). It integrates sustainability principles—such as ethical conduct, resource stewardship, and social and environmental accountability—into leadership practices alongside traditional business goals (Fry & Egel, 2021; Woo & Kang, 2020). By embedding sustainability into innovation strategies, sustainable leadership promotes environmentally conscious innovation through the development of green products, services, and processes that enhance resource efficiency and reduce environmental impact (Khairy et al., 2023; Galpin & Lee, 2012). Moreover, sustainable leadership fosters a learning-oriented environment that supports collaboration and continuous improvement in sustainability by encouraging the acquisition and integration of green knowledge, technologies, and regulatory insights, thereby strengthening green absorptive capacity (Iqbal et al., 2020a; Iqbal et al., 2020b; Alhemimah et al., 2024). It also shapes green entrepreneurial orientation by embedding environmental considerations into entrepreneurial values, promoting innovation, proactivity, and responsible risk-taking aligned with sustainability goals (Bahgat et al., 2021). Additionally, sustainable leadership contributes to the formation of a strong green organizational identity by embedding sustainability principles into organizational culture, policies, and leadership behaviors, reinforcing environmental accountability across all organizational levels (Hu et al., 2023; Chang & Hung, 2021).

Furthermore, a robust capacity for absorbing green knowledge empowers the organization to effectively acquire and integrate new environmentally friendly insights, thus bolstering its capacity to generate innovative green concepts and solutions (Aboelmaged & Hashem, 2019; Song et al., 2020; Al-Husain et al., 2025). A green entrepreneurial orientation fuels

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the impetus and determination to pursue these inventive ideas, culminating in the creation and execution of green innovations (Liu et al., 2022). Furthermore, a firm green organizational identity nurtures a supportive and collaborative atmosphere, motivating employees to contribute their expertise and ingenuity to green innovation endeavors (Song & Yu, 2018).

Despite the growing emphasis on sustainability and green innovation across different sectors, there is a research void regarding these dimensions within the framework of tourism and hospitality enterprises. Given the sector's distinct attributes, including its dependence on natural resources and its influence on local communities, it presents a significant context for examining the dynamics among sustainable leadership, green innovation, and associated mediating variables. While past studies have delved into the link between sustainable leadership and green innovation performance, there is a notable gap in exploring the mediating influences of green absorptive capability, green entrepreneurial orientation, and green organizational identity within this correlation. Understanding the pivotal role of these mediating elements is essential for comprehending the impact of sustainable leadership practices on green innovation performance in tourism and hospitality enterprises.

Despite growing interest in sustainable and green leadership in the tourism and hospitality sector, several gaps remain in understanding the mechanisms through which leadership influences green innovation outcomes. Recent studies have highlighted the role of specific leadership styles—such as authentic, adaptive, paradoxical, and green inclusive leadership—in shaping employees' green behaviors, commitment, and innovative capacities (Al-Romeedy et al., 2025; Hasanein et al., 2025; Khairy & Badwy, 2025; Qalati et al., 2025; Salama et al., 2025; Hasanein & Khairy, 2026). However, most of these studies focus on direct relationships between leadership and green outcomes, often overlooking the complex mediating and moderating mechanisms that may explain how sustainable leadership translates into green innovation performance. In particular, the roles of green absorptive capability, entrepreneurial orientation, and organizational identity remain underexplored in the context of tourism and hospitality businesses. Addressing these gaps is critical to providing a more nuanced understanding of how sustainable leadership can drive green innovation, offering both theoretical insights and practical guidance for managers seeking to integrate sustainability into organizational processes. Accordingly, the study aims to assess the influence of sustainable leadership on green innovation performance, green absorptive capability, green entrepreneurial orientation, and green organizational identity within the tourism and hospitality sector. Additionally, it seeks to explore how green absorptive capability, green entrepreneurial orientation, and green organizational identity affect green innovation performance. Furthermore, the study intends to investigate the intermediary functions of green absorptive capability, green entrepreneurial orientation, and green organizational identity in connecting sustainable leadership with green innovation performance. To address the study's objectives, we examine how green absorptive capability, green entrepreneurial orientation, and green organizational identity mediate the relationship between sustainable leadership and green innovation performance in tourism and hospitality organizations. Specifically, the study seeks to answer the following research questions:

- How does sustainable leadership influence green innovation performance in tourism and hospitality organizations?
- To what extent do green absorptive capability, green entrepreneurial orientation, and green organizational identity mediate the relationship between sustainable leadership and green innovation performance?
- How can understanding these mechanisms inform both theory and practice in sustainable leadership and green innovation management?

The findings are expected to enrich theoretical insights and provide practical guidance for fostering sustainability and green innovation within the tourism and hospitality sector. Importantly, the Egyptian tourism and hospitality sector is a critical contributor to the country's economy, accounting for a significant share of GDP and employment. In recent years, the industry has faced growing pressures to adopt sustainable practices due to environmental concerns, regulatory requirements, and increasing demand from eco-conscious tourists. Despite these pressures, the integration of sustainable leadership and green innovation remains uneven, with many organizations struggling to translate sustainability intentions into tangible outcomes. This context provides a unique opportunity to examine how sustainable leadership can foster green innovation performance through mechanisms such as green absorptive capability, entrepreneurial orientation, and organizational identity. Investigating these pathways within Egypt's tourism and hospitality sector not only enhances the practical relevance of the study but also contributes to the broader literature by highlighting how contextual factors influence the effectiveness of sustainability-oriented leadership strategies.

## LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

### 1. Diffusion of Innovation Theory

The Diffusion of Innovation Theory, which elucidates the spread of new ideas and technology within cultures, provides valuable insights into the adoption of sustainability-related innovations within organizations (Wejnert, 2002). According to this theory, the perceived advantages of implementing sustainable leadership practices can significantly influence the uptake and dissemination of green innovation within organizational contexts. Sustainable leadership, by emphasizing the integration of sustainability principles, offers benefits such as enhanced reputation, cost savings through resource efficiency, and strengthened stakeholder relationships (Quinn & Dalton, 2009). These perceived advantages serve as motivational factors for organizations to cultivate green absorptive capability, foster a green entrepreneurial orientation, and nurture a green organizational identity, ultimately leading to heightened levels of green innovation performance (Bahgat et al., 2021).

Compatibility, as highlighted in the Diffusion of Innovation Theory, denotes the degree to which sustainable leadership practices resonate with the values, norms, and objectives of tourism and hospitality enterprises. The seamless alignment between sustainable leadership and industry core values enhances the likelihood of adopting and assimilating green absorptive capability, green entrepreneurial orientation, and green organizational identity within organizations (Lopes et al., 2023; Verma & Kumar, 2022). This compatibility fosters a conducive environment for the uptake and execution of green innovation

initiatives, thus facilitating their diffusion and implementation. The Diffusion of Innovation Theory underscores the significance of innovation champions in spearheading the uptake and propagation of innovations. Sustainable leaders can assume the role of innovation champions by championing and endorsing green absorptive capability, green entrepreneurial orientation, and green organizational identity. Their pivotal role lies in championing sustainability, motivating staff, and fostering a culture that esteems and supports green innovation. Through their leadership, sustainable leaders can catalyze the dissemination of green innovation within tourism and hospitality enterprises (Kumar & Sheoran, 2021).

## **2. The effect of sustainable leadership on green innovation performance**

Sustainable leadership encompasses leadership actions and strategies aimed at fostering and advancing sustainability principles within organizations. Conversely, green innovation performance pertains to organizations' capacity to conceive and execute environmentally conscious and sustainable innovations (Bahgat et al., 2021). Sustainable leadership delineates a definitive vision and trajectory congruent with sustainability objectives and principles. It underscores the significance of environmental stewardship and establishes ambitious benchmarks for green innovation. Through cultivating a shared vision, sustainable leaders instill inspiration and motivation among employees to actively participate in green innovation endeavors (Redekop, 2024; Verburg, 2019). Sustainable leadership molds the organizational ethos and atmosphere to cultivate a conducive milieu for green innovation (Arici & Uysal, 2022; Vargas-Hernández & Ali, 2022). In addition, sustainable leaders underscore the importance of learning and continual advancement by endorsing experimentation, risk assumption, and introspection. They instill a culture inclined towards learning, where setbacks are regarded as avenues for enhancement and innovation. By fostering a culture of learning, sustainable leaders empower organizations to adapt and innovate in response to environmental exigencies and evolving sustainability mandates (Wei, 2024; McAteer, 2019).

Sustainable leadership delegates authority and autonomy to employees, empowering them to make decisions and contribute to green innovation initiatives. This fosters an environment where employees are encouraged to share their ideas and take ownership of sustainability-driven projects. Through the delegation of authority, sustainable leadership cultivates a sense of ownership and responsibility, which can boost employee motivation and creativity in devising and executing green innovation strategies (Faulks et al., 2021; Iqbal et al., 2020a, Khairy et al., 2026). So, the following hypothesis is proposed:

**H1:** Sustainable leadership positively affects green innovation performance.

## **3. The effect of sustainable leadership on green absorptive capability**

Green absorptive capability denotes an organization's capacity to acquire, integrate, and utilize knowledge and methodologies pertaining to environmental sustainability (Pacheco et al., 2018; Qu et al., 2022). Sustainable leadership cultivates an environment of continuous learning and knowledge exchange within the organization. It motivates employees to share insights, best practices, and experiences concerning sustainability. By endorsing a culture of learning, sustainable leadership facilitates the assimilation and application of novel knowledge and methodologies, thus fostering the development of green absorptive capability (Hargreaves & Fink, 2012). Sustainable leadership strategically distributes resources, encompassing time, finances, and personnel, to bolster sustainability endeavors and foster the growth of green absorptive capability. It further guarantees employees access to pertinent training, educational, and developmental avenues pertaining to sustainability. Through provisioning essential resources and backing, sustainable leadership empowers employees to enrich their expertise and competencies, thus fortifying the organization's green absorptive capability (Al-Romeedy, 2024). Sustainable leaders lead by example, showcasing sustainable practices and behaviors in their own conduct. Their dedication to sustainability is evident in their choices and actions, setting a precedent for employees to emulate. By embodying sustainability, sustainable leaders establish a cultural standard that fosters the cultivation of green absorptive capability across the organization (Bahgat et al., 2021). Hence, the following hypothesis is suggested:

**H2:** Sustainable leadership positively affects green absorptive capability.

## **4. The effect of green absorptive capability on green innovation performance**

Green absorptive capability empowers organizations to gather information and expertise concerning sustainable methodologies, technologies, and market dynamics. Through proactive efforts to assimilate green insights from diverse internal and external channels, organizations remain abreast of cutting-edge advancements in sustainable innovation.

This proactive knowledge accumulation lays the groundwork for formulating innovative concepts and strategies that harmonize with environmental objectives (Chen et al., 2015; Qu et al., 2022). Green absorptive capability entails the integration and incorporation of environmentally conscious knowledge within an organization. It equips organizations with the capacity to comprehend, interpret, and tailor the acquired knowledge to suit their particular circumstances and functions (Chen et al., 2014; Ozgul, 2022). By adeptly assimilating this knowledge, organizations can infuse green principles and methodologies into their innovation frameworks, guaranteeing that sustainability factors are woven throughout the entire lifecycle of green innovation, from inception to execution (Khan et al., 2021; Adams et al., 2016; Agina et al., 2025).

Green absorptive capability cultivates cooperation and knowledge dissemination within organizational settings (Chen et al., 2014). It promotes interdisciplinary collaboration, the sharing of insights, and the interchange of perspectives and experiences concerning sustainability (Gölgeci et al., 2019; Lin et al., 2020). By establishing a collaborative milieu, organizations can harness the diverse proficiencies of their workforce and foster a collective learning ethos (Edmondson, 2012). This collaborative learning paradigm augments the generation of inventive concepts and bolsters the advancement of green innovation performance (Hong et al., 2019; Cui et al., 2021). Green absorptive capability cultivates a culture of perpetual enhancement and creativity (Qu et al., 2022). Therefore, the following hypothesis is assumed:

**H3:** Green absorptive capability positively affects green innovation performance.

### **5. The mediating role of green absorptive capability in the link between sustainable leadership and green innovation performance**

Sustainable leadership initiatives cultivate an atmosphere where knowledge exchange and learning thrive throughout the organization. Leaders committed to sustainability urge employees to disseminate their green insights, experiences, and exemplary methods, fostering a collaborative environment for learning. This culture of shared knowledge and learning plays a pivotal role in nurturing green absorptive capability, empowering employees to access new insights, draw lessons from one another's experiences, and collaboratively amass a wealth of sustainable practices. Leveraging this collective knowledge base, the organization advances its green innovation performance (Park & Kim, 2018; Iqbal & Ahmad, 2021).

Sustainable leadership assumes a pivotal role in harmonizing the organization's values and objectives with sustainability imperatives (Iqbal & Ahmad, 2021). It articulates a coherent vision for sustainability, underlining its significance and relevance within the organization's overarching mission and strategic framework (Galpin et al., 2015). Through this alignment of values and objectives, sustainable leadership instills a collective sense of purpose and a resolute dedication to sustainability among employees. This harmonization strengthens the organization's absorptive capability by cultivating a shared comprehension and drive to acquire, internalize, and apply green knowledge, consequently fostering a positive impact on green innovation performance (Bahgat et al., 2021). So, the following hypothesis is postulated:

**H4:** green absorptive capability mediates the link between sustainable leadership and green innovation performance.

### **6. The effect of sustainable leadership on green entrepreneurial orientation**

Green entrepreneurial orientation denotes an organization's proactive and innovative stance in identifying, seizing, and developing opportunities linked to environmental sustainability. It embodies a mindset integrating environmental considerations into strategic decision-making, product innovation, and business strategies (Shafique et al., 2021; Makhloufi et al., 2022). Sustainable leadership plays a pivotal role in nurturing a culture that prioritizes environmental sustainability and entrepreneurial mindset (Iqbal et al., 2020b; Razzaque et al., 2024). It promotes values and conducts that inspire employees to think innovatively, embrace risks, and capitalize on sustainability-related prospects. It cultivates an atmosphere of innovation, continuous learning, and experimentation, empowering employees to generate and implement green entrepreneurial initiatives (Feng et al., 2022; Abdelhamied et al., 2023). Sustainable leaders outline a distinct vision and establish objectives in harmony with environmental sustainability. They convey the significance of integrating sustainability into the organization's strategic trajectory and underscore the necessity for a green entrepreneurial mindset. Through aligning the vision and objectives with sustainability, sustainable leaders instill a sense of purpose and orientation, steering employees' entrepreneurial endeavors toward green initiatives (Galpin & Lee, 2012; Hargreaves & Fink, 2012).

Sustainable leadership fosters a culture of risk-taking and experimentation in the exploration of green entrepreneurial prospects. Sustainable leaders cultivate an atmosphere that nurtures and acknowledges innovative thought, even when it entails risk. They advocate for a culture of learning that regards failures as instructive opportunities. This ethos inspires employees to delve into novel concepts, question traditional perspectives, and trial sustainable business models or methods, thus cultivating a green entrepreneurial mindset (Iqbal et al., 2020a; Dunphy & Benn, 2013). So, the following hypothesis is proposed:

**H5:** Sustainable leadership positively affects green entrepreneurial orientation.

### **7. The effect of green entrepreneurial orientation on green innovation performance**

A robust green entrepreneurial orientation fosters idea generation and creativity within the realm of environmental sustainability. Enterprises embracing such an orientation inspire their workforce to think innovatively and craft novel solutions for tackling environmental issues. This focus on creativity stimulates the emergence of fresh ideas and concepts that can significantly influence green innovation performance (Khan et al., 2023; Jiang et al., 2018). A green entrepreneurial orientation empowers organizations to recognize and capitalize on opportunities associated with environmental sustainability (Shehzad et al., 2023). Organizations adopting such an orientation, diligently survey the external landscape for niche markets, emerging patterns, and consumer preferences pertaining to green offerings, services, and methodologies. Through this proactive approach, organizations can devise inventive solutions that align with sustainability objectives and customer requirements, thus bolstering their performance in green innovation (Khairy et al., 2023).

As well, green entrepreneurial orientation cultivates organizational learning and adaptability in the quest for superior green innovation performance. Enterprises exhibiting robust green entrepreneurial orientations nurture an environment characterized by ongoing learning and refinement. They promote knowledge sharing among employees, encourage the assimilation of lessons from experience, and advocate for flexible approaches to environmental sustainability. This commitment to continual learning and adaptation empowers organizations to elevate their green innovation performance progressively (Abdelhamied et al., 2023; Bahgat et al., 2021). So, the following hypothesis is proposed:

**H6:** Green entrepreneurial orientation positively affects green innovation performance.

### **8. The mediating role of green entrepreneurial orientation in the link between sustainable leadership and green innovation performance**

Sustainable leadership entails a firm dedication to environmental sustainability and a well-defined vision for embedding sustainability within the organization's strategic objectives (Ferdig, 2007; Galpin & Lee, 2012). Through effective communication of this vision, sustainable leaders inspire employees to synchronize their endeavors towards green innovation (Hargreaves & Fink, 2012). By exemplifying their allegiance to sustainability, leaders establish a shared sense of purpose and orientation, motivating employees to embrace a green entrepreneurial mindset and propel

green innovation performance (Makhloufi et al., 2022). Sustainable leadership molds organizational culture and principles to bolster green entrepreneurial orientation (Bapoo et al., 2022; Rasyid & Stepanus, 2024). It institutes standards and customs that prioritize sustainability, encompassing practices like resource preservation, waste minimization, and eco-conscious methodologies (Boeske & Murray, 2022). Such a culture underscores the significance of green innovation and serves as a groundwork for employees to cultivate and deploy their entrepreneurial mindset in the realm of environmental sustainability (Al-Swidi et al., 2021; Rizvi & Garg, 2021). Sustainable leadership integrates sustainability metrics and standards into performance assessments and acknowledgment structures. It acknowledges and incentivizes employees who actively engage in green innovation and exhibit a robust green entrepreneurial mindset. This acknowledgment underscores the significance of green innovation and inspires employees to persist in their endeavors, consequently amplifying green innovation performance (Bahgat et al., 2021). So, the following hypothesis is highlighted:

**H7:** Green entrepreneurial orientation mediates the link between sustainable leadership and green innovation performance.

### **9. The effect of sustainable leadership on green organizational identity**

Green organizational identity pertains to an organization's self-image, principles, and convictions concerning environmental sustainability. It encapsulates the degree to which an organization perceives itself as environmentally aware, accountable, and dedicated to sustainable behaviors. This identity shapes the organization's engagements, choices, and conduct concerning sustainability initiatives (Al-Romeedy & El-Sisi, 2024). Sustainable leadership plays a pivotal role in shaping and fostering a green organizational identity (Zhao & Zhou, 2019). Through consistent demonstration and communication of their dedication to sustainability, leaders convey a clear message to both employees and stakeholders regarding the organization's values and priorities (Doh & Quigley, 2014). By integrating sustainability into the organization's vision, mission, and strategic objectives, sustainable leaders ensure alignment with environmental stewardship (Iqbal & Ahmad, 2021). This harmonization cultivates a shared sense of purpose and identity centered on sustainability, thereby cultivating a robust green organizational identity (Al-Romeedy, 2024).

Sustainable leadership spearheads the integration of sustainable practices and policies within organizations (Opoku & Fortune, 2011; Al-Zawahreh et al., 2019). Through the implementation of eco-friendly measures like waste minimization, energy efficiency, and ethical sourcing, leaders manifest their dedication to sustainability. These ingrained practices and policies not only become intrinsic to the organization's functioning but also play a pivotal role in shaping its green organizational identity (Khairy et al., 2023). Sustainable leaders convey the organization's sustainability endeavors and accomplishments to external stakeholders. They engage in open and genuine communication regarding the organization's environmental initiatives, pledges, and advancements. This outward communication contributes to shaping the organization's image as an environmentally conscious and socially responsible entity, further solidifying its green organizational identity among external stakeholders (Bahgat et al., 2021). So, the following hypothesis is developed:

**H8:** Sustainable leadership positively affects green organizational identity.

### **10. The effect of green organizational identity on green innovation performance**

A green organizational identity signifies an organization's dedication to environmental sustainability and ethical conduct. When employees deeply resonate with the organization's green ethos, their values and objectives become synonymous with sustainability. This cohesion cultivates a collective dedication to green innovation, fostering a nurturing atmosphere where employees are driven to conceive and execute environmentally innovative concepts (Al-Romeedy & El-Sisi, 2024). The green organizational identity molds the organizational culture and sets standards that foster and endorse green innovation (Song & Yu, 2018). When sustainability becomes intrinsic to the organization's identity, it shapes behaviors, practices, and workplace norms. This integration prompts employees to collaborate, exchange knowledge, and rally behind one another in conceiving and executing green innovation endeavors, fostering a culture characterized by innovation and sustainability (Gioia et al., 2013; Arfi et al., 2018).

The green organizational identity inspires employees to unleash their creativity and tackle sustainability-related issues (Al-Romeedy & El-Sisi, 2024; Song & Yu, 2018). When employees deeply resonate with the organization's green ethos, they exhibit a heightened propensity for creative thinking and innovation in addressing environmental concerns. They approach problem-solving through a sustainability-focused lens, taking into account the ecological, social, and economic dimensions of their proposed solutions. This innovative problem-solving mindset fosters the emergence of fresh and sustainable ideas that propel green innovation performance (Chang & Chen, 2013; Chang & Hung, 2021). A robust green organizational identity cultivates collaboration among various departments and functions within the organization. Green innovation frequently demands interdisciplinary cooperation, given the multifaceted nature of sustainability issues. When employees align with the organization's green ethos, they exhibit greater openness to collaborating with peers from different areas of expertise, pooling their skills toward green innovation endeavors. This collaborative spirit nurtures cross-disciplinary perspectives, facilitates the sharing of knowledge, and amplifies collective endeavors, thereby driving improved green innovation performance (Yuan & Cao, 2022; Al-Romeedy & El-Sisi, 2024). So, the following hypothesis is assumed:

**H9:** Green organizational identity positively affects green innovation performance.

### **11. The mediating role of green organizational identity in the link between sustainable leadership and green innovation performance**

Sustainable leadership places a high emphasis on clear and transparent communication regarding sustainability objectives, advancements, and obstacles (Quinn & Dalton, 2009). It maintains open and candid dialogue with employees

concerning the company's sustainability endeavors and the reasoning behind particular choices. This transparent communication cultivates trust, deepens employees' comprehension of the organization's environmental stance, and nurtures a collective dedication to excelling in green innovation (Hargreaves & Fink, 2012). Sustainable leadership dedicates resources to training and development programs aimed at augmenting employees' proficiency in sustainability and green innovation. Through such initiatives, sustainable leaders empower employees to make meaningful contributions to green innovation endeavors. This commitment to employee growth not only strengthens the organization's green identity but also bolsters its performance in green innovation (Singh et al., 2020).

The green organizational identity, cultivated by sustainable leadership, contributes significantly to the organization's external acknowledgment and reputation as a sustainability frontrunner. A robust green identity bolsters the organization's credibility, attracting stakeholders who prioritize sustainability and fostering opportunities for collaboration and partnership. This external acknowledgment and reputation, in turn, bolster and affirm the organization's green innovation performance. Sustainable leaders adopt a forward-thinking approach to sustainability, underscoring the significance of persistent environmental practices and sustained value creation. By prioritizing sustainable practices aimed at long-term benefits rather than short-term gains, sustainable leaders fortify the organization's green identity and dedication to continual green innovation performance (Al-Romeedy & El-Sisi, 2024; Bahgat et al., 2021). So, the following hypothesis is formulated:

**H10:** Green organizational identity mediates the link between sustainable leadership and green innovation performance. The hypothesized research framework is presented in Figure (1) below.

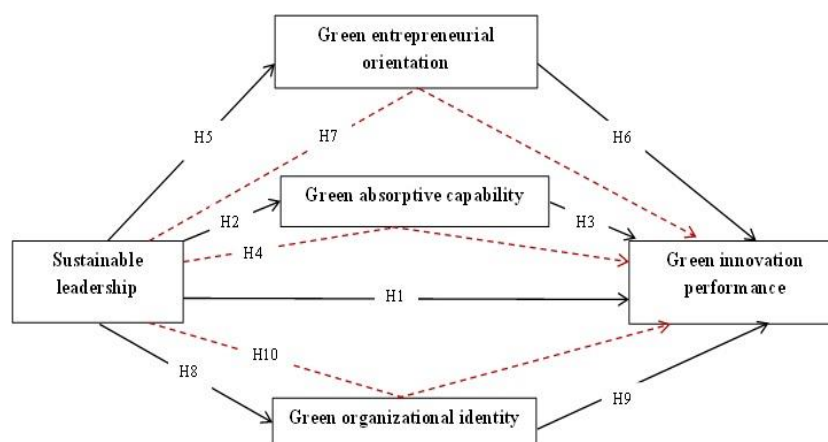


Figure 1. The hypothesized research framework

## RESEARCH METHODOLOGY

### 1. Sample and data collection procedures

The study examines tourism and hospitality businesses operating in Egypt, including A-rated travel agencies and five-star hotels, known for their exceptional services and dedication to environmental conservation, implementing green initiatives for sustainability to enhance their operations. In addition, the study examines mid-level management because they play a crucial role in strategy formulation, product idea development, and filtering ideas from bottom-up to top managers, and also influence organizational hierarchies (Jackson & Humble, 1994; Gjerde & Alvesson, 2020).

A list of 30 five-star hotels and 1666 category-A travel agencies in the Greater Cairo area was provided (The Egyptian Ministry of Tourism and Antiquities, 2022). Following verbal consent for the visit and distribution, a questionnaire was distributed to 60 category-A travel agencies and 25 five-star hotels. The study used a judgmental sample to select five-star hotels and travel agencies, while a convenience sample was used to collect data from volunteered participants in the Greater Cairo region of Egypt. The study involved 320 participants, with 205 men (64.1%) and 115 women (35.9%). 96 (30%) of respondents aged 18-<35, 130 (40.6%) aged 35-<45, and 94 (29.4%) aged 45 or older. In addition, 176 (55%) of participants have a bachelor's degree, 62 (19.4%) have a high school degree, and 82 (25.6%) have a Master/PhD degree. Moreover, 35% of participants (n=112) had 2-5 years of tenure, 45% (n=144) had 6-<10 years, and 20% (n=64) had ≥10 years. Of the participants, 60.6% (n=194) worked for five-star hotels, and travel agencies employed 39.4% (n=126).

### 2. Measures

This study used a quantitative research method that employed a structured survey to evaluate sustainable leadership in tourism and hospitality businesses, focusing on its impact on green innovation performance, and the mediating roles of green absorptive capability, green entrepreneurial orientation, and green organizational identity. The survey is divided into two sections: one covers employee profiles, and the other uses a five-point Likert scale to assess each of the five concepts under investigation. Sustainable leadership was evaluated by a 15-item scale suggested by McCann & Holt (2010). Sample item includes: "My leader acts in a sustainable socially responsible manner". In addition, green innovation performance was assessed by a 10-item scale adapted from Wang et al. (2022), for example, "Our firm has developed new products or services in environmental management in the past two years". Moreover, green absorptive capability was evaluated by a 4-item scale adapted from Özgül & Zehir (2022). For instance, "Our firm can quickly absorb, master, and use green equipment and

production processes obtained from outside”. Furthermore, green entrepreneurial orientation was assessed by a 5-item scale adapted from Guo et al. (2020). For example, “Our firm has an attitude of adventure and proactiveness to green projects when faced with uncertainty”. Lastly, green organizational identity was measured by a 6-item scale developed by Chen (2011). For example, “the company’s top managers, middle managers, and employees have a sense of pride in the company’s environmental goals and missions”. Appendix (A) presents the comprehensive measurement scale items. The questionnaire was meticulously translated through a back-translation procedure to guarantee accuracy and equivalence. Its clarity, cultural appropriateness, and practical relevance were further validated by reviews from academic experts and hotel industry practitioners.

### 3. Data analysis

WarpPLS statistical software 7.0 was used for data analysis. WarpPLS is particularly suitable for models with complex relationships, including multiple mediating and moderating effects, as is the case in our conceptual framework. It also effectively handles non-normal data distributions and allows for simultaneous assessment of both measurement and structural models, providing robust and reliable parameter estimates. The study utilized PLS-SEM, a statistical method for theory validation and extension, for data processing in complex models. It is suitable for strategic and management studies, particularly in hospitality and tourism research. Using t-tests, the study found no significant difference between early and late surveys in terms of non-response bias ( $p > 0.05$ ). The study also conducted a multi-group analysis to identify significant differences in path coefficients between hotels and travel agencies, with the results being insignificant ( $P > 0.05$ ). In addition, the study used Harman’s single-factor test and principal component analysis to assess common method variance, finding no dominant factor contributing to over 50% of overall variation. Besides conducting Harman’s single-factor test, several procedural techniques were employed to mitigate common method variance (CMV). Respondents were assured of anonymity and confidentiality, helping to reduce social desirability bias and evaluation apprehension. Furthermore, the survey items for independent, mediating, and dependent variables were presented in separate sections of the questionnaire to minimize immediate context effects.

## RESULTS

### 1. Measurement model

The five-factor model, which includes sustainable leadership, green innovation performance: green absorptive capability, green entrepreneurial orientation, and green organizational identity, was assessed through confirmatory factor analysis. Kock’s (2021) fifteen fit indices were used to evaluate the model’s fit: APC “ $P < 0.05$ ”, ARS “ $P < 0.05$ ”, AARS “ $P < 0.05$ ”, AVIF “acceptable if  $\leq 5$ , ideally  $\leq 3.3$ ”, AFVIF “acceptable if  $\leq 5$ , ideally  $\leq 3.3$ ”, GoF “small  $\geq 0.1$ , medium  $\geq 0.25$ , large  $\geq 0.36$ ”, SPR “acceptable if  $\geq 0.7$ , ideally = 1”, RSCR “acceptable if  $\geq 0.9$ , ideally = 1”, SSR “acceptable if  $\geq 0.7$ ”, NLBCDR “acceptable if  $\geq 0.7$ ”, SRMR “acceptable if  $\leq 0.1$ ”, SMAR “acceptable if  $\leq 0.1$ ”, SChS “ $P < 0.05$ ”, STDCR “acceptable if  $\geq 0.7$ , ideally = 1”, and STDSR “acceptable if  $\geq 0.7$ , ideally = 1”. Well-fitting data were produced by the suggested five-factor model: “APC=0.424,  $P < 0.001$ ; ARS=0.523,  $P < 0.001$ ; AARS=0.521,  $P < 0.001$ ; AVIF=2.717; AFVIF=2.428; GoF=0.568; SPR=1.000; RSCR=1.000; SSR=1.000; NLBCDR=0.900; SRMR=0.105; SMAR=0.077; SChS=18.656,  $P < 0.001$ ; STDCR=0.955; and STDSR=0.828”.

The research constructs demonstrated composite reliability ratings above the acceptable threshold ( $CR > 0.70$ ) and significant item loadings ( $> 0.50$ ,  $p < 0.05$ ), as shown in Table (1). Sustainable leadership, green innovation performance: green absorptive capability, green entrepreneurial orientation, and green organizational identity all had AVE  $> 0.50$ , confirming convergent validity. The model is also considered free of common method bias as each latent variable’s VIF is  $\leq 3.3$ .

Table 1. Item loadings, Cronbach alpha, CR, AVE, and VIFs  
“CR: Composite reliability; CA: Cronbach’s alpha; AVE: average variance extracted; VIF: variance inflation factors “

Construct	Indicators	Loading	CR	CA	AVE	VIF	Construct	Indicators	Loading	CR	CA	AVE	VIF
Sustainable Leadership (SL)	SL.1	0.819	0.952	0.946	0.573	2.424	Green Innovation Performance (GIP)	GIP.1	0.900	0.948	0.938	0.648	2.821
	SL.2	0.865						GIP.2	0.835				
	SL.3	0.740						GIP.3	0.866				
	SL.4	0.764						GIP.4	0.703				
	SL.5	0.636						GIP.5	0.744				
	SL.6	0.715						GIP.6	0.710				
	SL.7	0.760						GIP.7	0.881				
	SL.8	0.788						GIP.8	0.827				
	SL.9	0.857						GIP.9	0.863				
	SL.10	0.705						GIP.10	0.681				
	SL.11	0.763					Green Absorptive Capability (GAC)	GAC.1	0.740	0.870	0.798	0.629	2.741
	SL.12	0.832						GAC.2	0.896				
	SL.13	0.616						GAC.3	0.851				
	SL.14	0.657						GAC.4	0.665				
	SL.15	0.787						Green Organizational Identity (GOI)	GOI.1				
Green Entrepreneurial Orientation (GEO)	GEO.1	0.766	GOI.2	0.787									
	GEO.2	0.679	GOI.3	0.823									
	GEO.3	0.813	GOI.4	0.733									
	GEO.4	0.820	GOI.5	0.801									
	GEO.5	0.799	GOI.6	0.759									

Table 2. Discriminant validity results - Fornell-Larcker Criterion

	GOI	SL	GIP	GEO	GAC
Green Organizational Identity (GOI)	<b>0.794</b>				
Sustainable Leadership (SL)	0.486	<b>0.757</b>			
Green Innovation Performance (GIP)	0.483	0.603	<b>0.805</b>		
Green Entrepreneurial Orientation (GEO)	0.488	0.734	0.665	<b>0.777</b>	
Green Absorptive Capability (GAC)	0.521	0.611	0.763	0.618	<b>0.793</b>
"Off-diagonal elements are correlations, and diagonal elements are square roots of AVE"					

Table 3. HTMT for validity

HTMT ratios (good if < 0.90, best if < 0.85)	GOI	SL	GIP	GEO	GAC
Green Organizational Identity (GOI)					
Sustainable Leadership (SL)	0.536				
Green Innovation Performance (GIP)	0.538	0.644			
Green Entrepreneurial Orientation (GEO)	0.567	0.847	0.750		
Green Absorptive Capability (GAC)	0.638	0.721	0.899	0.789	
<b>P values (one-tailed) for HTMT ratios (good if &lt; 0.05)</b>	GOI	SL	GIP	GEO	GAC
Green Organizational Identity (GOI)					
Sustainable Leadership (SL)	<0.001				
Green Innovation Performance (GIP)	<0.001	<0.001			
Green Entrepreneurial Orientation (GEO)	<0.001	0.003	<0.001		
Green Absorptive Capability (GAC)	<0.001	<0.001	0.034	<0.001	

By verifying that the square root of the AVE for each of the constructs is larger than the off-diagonal correlations (refer to Table 2) and by computing the HTMT (refer to Table 3), the discriminant validity of the constructs was verified.

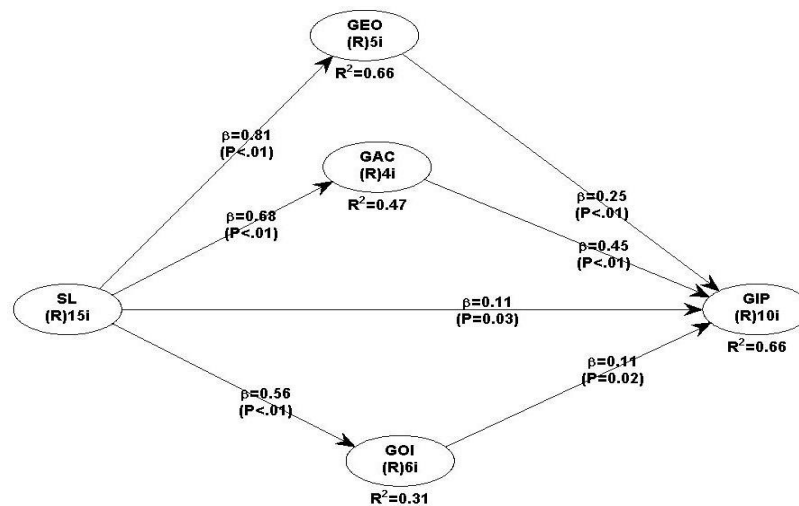


Figure 2. Final model of the study

## 2. Results of testing hypotheses

Figure (2) and Table (4) show sustainable leadership (SL) positively affects green innovation performance (GIP) ( $\beta=0.11$ ,  $P=0.03$ ), green absorptive capability (GAC) ( $\beta=0.68$ ,  $P<0.01$ ), green entrepreneurial orientation (GEO) ( $\beta=0.81$ ,  $P<0.01$ ), and green organizational identity (GOI) ( $\beta=0.56$ ,  $P<0.01$ ). This means SL leads to an increase in GIP, GAC, GEO, and GOI, thus supporting the hypothesis H1, H2, H5, and H8. In addition, GIP is positively affected by GAC ( $\beta=0.45$ ,  $P<0.01$ ), GEO ( $\beta=0.25$ ,  $P<0.01$ ), and GOI ( $\beta=0.11$ ,  $P=0.02$ ). GAC, GEO, and GOI increases GIP, supporting H3, H6, and H9.

Table 4. Direct effects; GEO  $R^2 = 0.66$ , GAC  $R^2 = 0.47$ , GOI  $R^2 = 0.31$ , GIP  $R^2 = 0.66$

Hs	Relationship	Direct effect ( $\beta$ )	Sig.	Decision
H1	SL→GIP	0.11	$P=0.03$	Supported
H2	SL→GAC	0.68	$P<0.01$	Supported
H3	GAC→GIP	0.45	$P<0.01$	Supported
H5	SL→GEO	0.81	$P<0.01$	Supported
H6	GEO→GIP	0.25	$P<0.01$	Supported
H8	SL→GOI	0.56	$P<0.01$	Supported
H9	GOI→GIP	0.11	$P=0.02$	Supported

The results indicate that sustainable leadership positively influences green innovation performance through green absorptive capability, green entrepreneurial orientation, and green organizational identity. For hotels, this suggests that

managers who actively promote sustainability can enhance environmentally friendly practices in operations, service design, and guest experiences, thereby improving both ecological outcomes and customer satisfaction. For Category-A travel agencies, the findings highlight the importance of embedding green initiatives into business models and strategic planning, enabling the agencies to proactively respond to environmental regulations and growing customer demand for sustainable tourism options. Furthermore, the mediation effects of GAC, GEO, and GOI in SL→GIP relationship were calculated using the method developed by Preacher & Hayes (2008). According to Table (5), the indirect effect of GAC, GEO, and GOI, with a 95% bootstrapped confidence interval (LL, UL), does not cross a zero in between, confirming mediation. Therefore, the study found that GAC, GEO, and GOI significantly mediate SL→GIP relationship, supporting H4, H7, and H10.

The coefficient of determination ( $R^2$ ) values indicates the proportion of variance in each dependent variable explained by the predictors. In this study, sustainable leadership explains 66% of the variance in green entrepreneurial orientation (GEO), 47% in green absorptive capability (GAC), and 31% in green organizational identity (GOI). Collectively, these mediators, along with sustainable leadership, account for 66% of the variance in green innovation performance (GIP). These substantial  $R^2$  values suggest that the model has strong explanatory power, demonstrating that sustainable leadership and its organizational mechanisms are significant drivers of green innovation in tourism and hospitality organizations. Practically, this indicates that hotels and Category-A travel agencies can achieve meaningful improvements in green innovation performance by fostering sustainable leadership and enhancing these mediating capabilities.

The mediation analysis indicates that all three mediators—green absorptive capability (GAC), green entrepreneurial orientation (GEO), and green organizational identity (GOI)—significantly transmit the effects of sustainable leadership (SL) on green innovation performance (GIP). Among them, GAC exhibits the strongest indirect effect (0.306, 95% CI: 0.245–0.367), followed by GEO (0.203, 95% CI: 0.142–0.263) and GOI (0.062, 95% CI: 0.005–0.118). This suggests that developing organizational capacity to acquire, assimilate, and apply green knowledge is the most critical mechanism through which sustainable leadership enhances green innovation performance. Practically, this highlights the importance for hotels and Category-A travel agencies to invest in training, knowledge management systems, and processes that strengthen green absorptive capability to maximize innovation outcomes.

Table 5. Mediation analysis' Bootstrapped Confidence Interval

Hypo.		Path a	Path b	Indirect Effect	SE	t-value	Bootstrapped Confidence Interval		Mediation
							95% LL	95% UL	
H4	SL→GAC→GIP	0.680	0.450	0.306	0.031	9.871	0.245	0.367	Yes
H7	SL→GEO→GIP	0.810	0.250	0.203	0.031	6.532	0.142	0.263	Yes
H10	SL→GOI→GIP	0.560	0.110	0.062	0.029	2.124	0.005	0.118	Yes

## DISCUSSION

The study investigates the role of sustainable leadership in enhancing green innovation performance in tourism and hospitality enterprises, focusing on green absorptive capability, entrepreneurial orientation, and organizational identity as mediators. The study reveals that sustainable leadership significantly influences green innovation performance, consistent with previous research by Faulks et al. (2021) and Iqbal et al. (2022). Leaders who prioritize sustainability cultivate an organizational culture that esteems and promotes green innovation (Wang, 2019). They foster an atmosphere where employees feel empowered to experiment with new ideas aligned with sustainability objectives. This entails providing the requisite resources, including time, funding, and training, to explore innovative solutions. By recognizing creative endeavors and embracing the risks associated with experimentation, sustainable leaders bolster the organization's capability for green innovation (Bahgat et al., 2021). The study also indicates that sustainable leadership significantly impacts green absorptive capability, aligning with previous studies by Bahgat et al. (2021) and Al-Romeedy (2024).

Sustainable leadership demonstrates adeptness in change management and cultivates organizational agility, understanding that sustainability necessitates continual evolution and refinement. By instilling flexibility and adaptability, sustainable leadership nurtures the growth of green absorptive capability, ensuring that the organization can swiftly adapt to evolving sustainability landscapes and requirements (Alnasser et al., 2025; Khairy et al., 2025a). Encouraging a culture that embraces change, sustainable leadership motivates employees to proactively seek and implement new green knowledge (Najrani, 2016; Alqarni et al., 2023; Agina et al., 2025). In addition, the study indicates that green absorptive capability positively impacts green innovation performance, aligning with research by Qu et al. (2022). Organizations actively engaged in the pursuit and integration of green knowledge are inclined toward adopting a mindset of continual learning and endeavor to unearth avenues for advancement (Shehzad et al., 2023a). They remain receptive to exploring fresh concepts, technologies, and methodologies conducive to fostering more sustainable and inventive outcomes. This disposition toward ongoing improvement and innovation propels the organization's green innovation performance, positioning it at the vanguard of sustainable practices and the creation of innovative green solutions (Shahzad et al., 2023b).

Moreover, the study suggests that green absorptive capability plays a mediating role in the relationship between sustainable leadership and green innovation performance, aligning with previous studies by Singh et al. (2020) and Al-Romeedy & Khairy (2024). Sustainable leadership underscores the significance of evaluating and overseeing green innovation performance (Arshad et al., 2023). Leaders in sustainability establish metrics and mechanisms for feedback to evaluate the efficiency and ramifications of green innovations. This evaluation and feedback loop offer invaluable insights that shape future innovation strategies and steer the development of absorptive capability. Through analyzing the outcomes and efficacy of green innovations, organizations pinpoint areas for enhancement, make well-informed decisions, and continually refine their absorptive capability and green innovation performance (Al-Romeedy, 2024).

Furthermore, the study suggests that sustainable leadership positively influences green entrepreneurial orientation, consistent with previous research by Feng et al. (2022). Sustainable leadership prioritizes capacity building and skill enhancement to enrich employees' entrepreneurial aptitude and comprehension of sustainability. It offers training sessions, workshops, and educational avenues geared towards furnishing employees with the skills and insights essential for green entrepreneurship. By arming employees with the necessary resources and proficiencies, sustainable leadership empowers them to recognize and leverage green prospects, stimulate innovation, and adeptly maneuver through the intricacies of sustainable business endeavors (Avery & Bergsteiner, 2012; Hargreaves & Fink, 2012).

Additionally, the study suggests that green entrepreneurial orientation positively impacts green innovation performance, consistent with previous research by Abdelhamied et al. (2023) and Khairy et al. (2023). A green entrepreneurial orientation nurtures employee involvement and enthusiasm for green innovation ventures. Enterprises displaying a robust green entrepreneurial orientation actively engage employees in decision-making, promote their involvement in green innovation projects, and offer avenues for skill enhancement and professional growth in sustainable practices. This active participation and motivation empower employees to contribute their insights, skills, and imaginative thinking to advance green innovation performance within the organization (Makhloufi et al., 2022; Guo et al., 2020).

Besides, the study indicates that green entrepreneurial orientation mediates the link between sustainable leadership and green innovation performance, aligning with previous studies by Bapoo et al. (2022) and Rasyid & Stepanus (2024). Sustainable leadership directs resources towards learning and growth initiatives aimed at enriching employees' proficiency in green innovation (Suriyankietkaew & Avery, 2016). It facilitates training sessions, workshops, and mentorship programs to cultivate employees' entrepreneurial mindset, creativity, and sustainability acumen (Waite, 2013).

Alongside, the study indicates that sustainable leadership positively affects green organizational identity, aligning with previous studies by Khairy et al. (2023) and Al-Romeedy (2024). Sustainable leadership incorporates sustainability factors into decision-making processes throughout the organization. It prompts employees to assess the environmental consequences of decisions and seek sustainable options. This approach to decision-making strengthens the organization's commitment to sustainability and guarantees that environmental considerations are ingrained in its strategic decisions (Quinn & Dalton, 2009; Avery, 2005). As well, the study indicates that a positive green organizational identity is linked to enhanced green innovation performance, aligning with a recent study by Al-Romeedy & El-Sisi (2024). A strong green organizational identity contributes positively to both retaining and attracting employees (Ma et al., 2023). When an organization is renowned for its steadfast green principles and dedication to sustainability, it becomes an appealing workplace for individuals passionate about environmental concerns. Employees who resonate with the organization's green ethos are more inclined to remain with the company, ensuring continuity in green innovation endeavors. Additionally, the organization's strong green identity acts as a beacon for top talent, drawing individuals eager to contribute to green innovation and bolstering overall performance in this domain (Al-Romeedy & El-Sisi, 2024).

Lastly, the study suggests that green organizational identity mediates the relationship between sustainable leadership and green innovation performance, consistent with research by Bahgat et al. (2021) and Al-Romeedy & El-Sisi (2024). Sustainable leadership proactively interacts with external stakeholders, including customers, suppliers, and community members, to advocate for sustainability and foster green innovation (Aftab et al., 2022). It actively seeks feedback, collaborates, and forges partnerships with stakeholders to jointly develop sustainable solutions (Kuenkel, 2016).

### **Theoretical implications**

The examination of the mediating roles of green absorptive capability, green entrepreneurial orientation, and green organizational identity in the relationship between sustainable leadership and green innovation performance in tourism and hospitality businesses enriches our understanding of the Diffusion of Innovation Theory in several ways.

Firstly, this study delves into and scrutinizes the specific mediating factors, namely green absorptive capability, green entrepreneurial orientation, and green organizational identity. These factors offer deeper insights into the mechanisms by which sustainable leadership influences green innovation performance. By shedding light on these mediating factors, the study broadens the scope of the Diffusion of Innovation Theory, uncovering additional variables that contribute to the dissemination and adoption of green innovation. Secondly, the study delves into the tourism and hospitality sector, providing valuable insights into the dynamics of sustainable leadership and green innovation within this specialized industry. By extending the theory's scope to encompass this particular context, it enhances comprehension of how diffusion mechanisms manifest across diverse sectors. This underscores the versatility and applicability of the Diffusion of Innovation Theory beyond conventional spheres, underscoring its relevance in industries grappling with unique sustainability and environmental issues. Thirdly, the study affirms the importance of sustainable leadership in improving green innovation performance. By illustrating how sustainable leadership practices influence innovation outcomes, the results echo the core principles of the Diffusion of Innovation Theory. They emphasize the central role of leadership in initiating and nurturing innovation within organizations. This validation strengthens the theoretical framework of the Diffusion of Innovation Theory by providing empirical support in the context of sustainability and green innovation.

### **Practical implications**

The findings of this study provide clear guidance for hotels and Category-A travel agencies seeking to enhance green innovation performance through sustainable leadership. First, managers should prioritize building employees' green knowledge and skills by implementing targeted training programs, workshops, and digital learning modules.

These initiatives can strengthen the ability to identify, acquire, and apply environmentally friendly practices, technologies, and processes, thereby enhancing innovation performance in sustainable services and operations.

Second, fostering a green entrepreneurial mindset is crucial. Managers can encourage proactive, innovative, and risk-taking behaviors by creating an environment that supports experimentation with sustainable business practices. Recognition and reward systems for employees who propose or implement novel green initiatives can stimulate creativity and promote a culture of environmentally focused entrepreneurship. Third, establishing a strong green identity within the workplace helps align staff with sustainability goals. Leaders should communicate a clear sustainability vision and involve employees in green initiatives through suggestion platforms, innovation competitions, and cross-departmental teams. Embedding sustainability into daily routines through symbols, storytelling, and rituals reinforces commitment and ensures that sustainable practices become an integral part of operations. Fourth, performance management and incentive systems should integrate sustainability metrics. Linking achievements in green innovation to promotions, bonuses, or formal recognition encourages active participation and sustained engagement in environmentally focused initiatives. Finally, collaboration and stakeholder engagement play a key role. Hotels and travel agencies should foster knowledge sharing internally across departments and externally with suppliers, research institutions, and industry networks to stay current with emerging green practices. Engaging customers, local communities, and industry partners provides insights into sustainability expectations and supports the development of innovative, environmentally responsible services. Policymakers can further facilitate these efforts by offering guidance, incentives, and frameworks that encourage green innovation in tourism and hospitality.

### Limitations and future research

While this study yields valuable insights, it's imperative to acknowledge its limitations and pinpoint potential paths for future investigation. Firstly, the study's conclusions are drawn from two activities within the tourism and hospitality sector.

It's crucial to note that distinct activities (such as airlines or restaurants) may possess differing characteristics and dynamics that impact the correlation between sustainable leadership and green innovation performance.

Future research endeavors could delve into how green absorptive capability, green entrepreneurial orientation, and green organizational identity function in alternative sectors and industries to gauge the applicability of the study's findings. Additionally, forthcoming studies could conduct comparative assessments across diverse organizations within the tourism and hospitality sector (such as travel agencies, hotels, airlines, restaurants) to examine variances in the interplay between sustainable leadership, the mediating factors, and green innovation performance. By contrasting organizations with varying levels of sustainability practices, sizes, geographical locations, and business models, researchers can glean insights into contextual dynamics and illuminate optimal strategies for fostering green innovation. Secondly, the study concentrated on scrutinizing the mediating functions of green absorptive capability, green entrepreneurial orientation, and green organizational identity. However, the study's cross-sectional design constrains the capacity to establish causation.

Future investigations could adopt longitudinal methodologies to scrutinize the causal connections between sustainable leadership, the mediating factors, and green innovation performance across time. Thirdly, the study delved into examining the mediating functions of green absorptive capability, green entrepreneurial orientation, and green organizational identity.

Nonetheless, there might exist other mediating or moderating variables shaping the association between sustainable leadership and green innovation performance. Subsequent research endeavors could explore supplementary factors, such as green organizational support, green talent management, green organizational culture, external institutional pressures, or individual-level elements, to furnish a more exhaustive comprehension of the underlying mechanisms.

Fourthly, while the study primarily centered on green innovation performance as the outcome variable, it would be advantageous to explore the enduring consequences of sustainable leadership and green innovation. This includes investigating long-term outcomes such as environmental impact, cost savings, competitive advantage, and customer satisfaction.

Appendix (A): Measurement Scale items

Sustainable leadership (SL)	SL1	My leader acts in a sustainable socially responsible manner.
	SL2	My leader acts in a sustainable environmentally responsible manner.
	SL3	My leader acts in a sustainable ethically responsible manner.
	SL4	My leader's decisions are made while considering the entire organisation.
	SL5	My leader's management officially recognises when a mistake is made that affects sustainability.
	SL6	My leader is willing to correct mistakes that affect sustainability.
	SL7	My leader attempts to use unique innovative methods to resolve sustainability issues.
	SL8	My leader attempts to create wealth through sustainable efforts.
	SL9	My leader puts purpose before profit.
	SL10	My leader balances sustainable social responsibility with profits.
	SL11	My leader demonstrates sustainability by persevering through all types of change.
	SL12	My leader is concerned how sustainability affects employees.
	SL13	My leader communicates sustainability decisions to all involved.
	SL14	My leader attempts to build a culture of sustainability through its communication efforts.
	SL15	My leader has plan to demonstrate sustainability when hiring, promoting employees and replacing leaders.
Green innovation performance (GIP)	GIP1	We have developed new products or services in environmental management in the past two years
	GIP2	We have selected less polluting product materials for product development or design
	GIP3	We have selected the product materials that consume the least energy and resources for product development or design
	GIP4	We have used minimal materials to compose products for product development or design
	GIP5	In the process of product development or design, we have carefully considered whether the product is easy to recycle, reuse, and decompose
	GIP6	We have adopted new methods of environmental management after conventional methods failed
	GIP7	The production process of enterprises has effectively reduced the discharge of harmful substances or waste

	GIP8	We have recycled waste and discharge in the production process so that these can be treated and used
	GIP9	Our production processes consume less water, electricity, coal, or oil
	GIP10	Our production process reduces the use of raw materials
Green entrepreneurial orientation (GEO)	GEO1	Our firm has an attitude of adventure and proactiveness to green projects when faced with uncertainty
	GEO2	Our firm has a strong tendency for high-risk green product development projects which have a chance for very high returns
	GEO3	Our firm has a strong emphasis on green R&D, technological leadership, and innovation
	GEO4	Our firm has a tendency to initiate green actions for competitors to respond to
	GEO5	Our firm has a tendency to be a market leader, always first in introducing green products, services, or technologies
Green absorptive capability (GAC)	GAC1	Our firm can quickly absorb, master, and use green equipment and production processes obtained from outside.
	GAC2	Our firm is good at acquiring and using external green technology and knowledge.
	GAC3	Our firm has a strong capacity for monitoring green technology development trends.
	GAC4	Our firm has a strong green technology integration capability.
Green organizational identity (GOI)	GOI1	The firm's top managers, middle managers, and employees have a strong sense of the company's history about environmental management and protection;
	GOI2	The firm's top managers, middle managers, and employees have a sense of pride in the company's environmental goals and missions;
	GOI3	The firm's top managers, middle managers, and employees feel that the company has carved out a significant position with respect to environmental management and protection;
	GOI4	The firm's top managers, middle managers, and employees feel that the company have formulated a well-defined set of environmental goals and missions;
	GOI5	The firm's top managers, middle managers, and employees are knowledgeable about the company's environmental traditions and cultures;
	GOI6	The firm's top managers, middle managers, and employees identify strongly with the company's actions with respect to environmental management and protection.

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