



Green synergy in hospitality: Unveiling the nexus between environmentally sustainable practices and hotel green performance

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ABSTRACT

The main purpose of the study is to examine the mediating role of green innovation (GI) and the moderating role of stakeholder engagement (SE) in the impact of environmental sustainability practices (ESPs) on green performance (PERF) in the hospitality sector based in Egypt. Data were collected from 236 employees of Egypt's 5-star hotels. The data were analyzed in Smart-PLS. The findings demonstrate that higher levels of environmental sustainability practices (support for host communities (S), waste management (W), and conservation projects (C) and green product innovation (Gpro), as well as green process innovation (Gprc), **lead to improved measures of green performance**. Therefore, green product innovation and green process innovation partially mediate environmental sustainability practices and green performance linkages. Furthermore, the findings confirm that SE moderates the direct and indirect impact of environmental sustainability practices on hotel green performance, using green innovation as a **mediating mechanism**.

1. Introduction

In the **hospitality industry**, the interplay between environmental sustainability practices (ESPs), green innovation (GI), and stakeholder engagement (SE) is pivotal for enhancing green performance (PERF) (Asadi et al., 2020). The concept of PERF—defined as the measurable improvement in environmental and economic outcomes resulting from sustainable practices—serves as the ultimate indicator of success in green hotels. Indeed, hospitality is one of the most consumptive

industries worldwide, significantly affecting energy consumption and carbon emissions. For instance, in 2021, hotels accounted for approximately 363 million tons of carbon dioxide emissions, or about 1 percent of total global emissions (Llanso, 2024). Such figures highlight the critical imperative for hotels to adopt robust ESPs. Despite the increased interest in sustainability, research focusing on how ESP intersects with green innovation and stakeholder engagement to improve hotel performance is still scant. Most of the literature so far tends to focus on each of these constructs singly; hence, a gap in knowledge regarding their

List of abbreviations: GI, green innovation; SE, stakeholder engagement; ESPs, environmental sustainability practices; PERF, green performance; S, support for host communities; W, waste management; C, conservation projects; Gpro, green product innovation; Gprc, green process innovation; IDT, innovation diffusion theory; CSR, corporate social responsibility; RBV, resource-based view; WOM, word of mouth.

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combined effects remains (Camilleri, 2022; Upadhyay and Vadam, 2015). For instance, although energy efficiency measures are crucially vital toward both cost reduction and reduced environmental impacts, there remains limited research on how integrating stakeholder engagement can further amplify such benefits (Upadhyay and Vadam, 2015). Engaging in ESP types of activities not only meets increasing environmental expectations from guests and regulatory bodies but also improves operational efficiencies and positions hotels as responsible corporate entities (Camilleri, 2022). Bohdanowicz (2006) and Chan (2008) illustrate that practices like energy efficiency and waste reduction are crucial for sustainable operations and can significantly enhance a property's appeal to environmentally conscious consumers. Furthermore, the adoption of green innovations, as discussed by Chen (2010) and Han et al. (2010), which include energy-efficient technologies and sustainable architectural designs, not only reduces operational costs but also enhances competitive advantage in a market increasingly drawn to eco-friendly businesses. Briefly, Chen (2010) focuses on drivers of brand equity in green marketing contexts, such as brand image, satisfaction, and trust, while Han et al. (2010) examine psychological determinants of consumer intention towards green hotels according to the Theory of Planned Behaviour. Both studies provide valuable information regarding consumer behaviour and marketing strategies in the green/environmentally sustainable industry. Additionally, effective stakeholder engagement highlighted in the research by Lehtinen and Aaltonen (2020) and Jalilvand et al. (2017) plays a crucial role in the successful implementation of these practices, influencing everything from reputation to customer loyalty and operational success. Value-based solutions induce true collaboration by inducing common values, such as the best-for-project principle and practices such as co-located workspaces that internalize these values. Dynamism-based solutions enable the timely and flexible organization to respond to evolving stakeholder needs. The study emphasizes that coordinating with external stakeholder engagement is a complex, cross-stakeholder problem-solving exercise with different internal stakeholders and is not solely the responsibility of project managers and emphasizes balancing structure, collaboration, and flexibility to generate value in inter-organizational projects. Their findings contribute a model of structuring with significant implications for project stakeholder management and overall stakeholder theory (Lehtinen and Aaltonen, 2020). Corporate social responsibility (CSR) indirectly fosters customer trust by its indirect impact on reputation and word of mouth (WOM), which themselves are closely connected with trust. Reputation is also a strong CSR antecedent of WOM, perpetuating the influence chain from CSR to trust via these mediators. Another study extended the hospitality management by applying both in the theoretical sense as it clarifies how CSR initiatives can perform as creating the structure of customer trust, and practically as it offers actionable advice to managers who desire to leverage reputation and WOM strategies in building trust in service industries (Jalilvand et al., 2017). Together, these elements create a synergistic effect that boosts overall green performance, demonstrating the essential nature of integrated sustainability strategies in the modern hospitality sector.

Hospitality industry plays a pivotal role in global tourism and economic development, but is also a significant contributor to environmental degradation. Recognizing the urgent need for sustainability, the industry has increasingly embraced environmental sustainability practices (Javaid et al., 2022). These practices, including energy efficiency, waste reduction, water conservation, sustainable sourcing, and SE, aim to mitigate the negative environmental impacts of hotel operations and tourism. Pioneering research by Bohdanowicz (2006), Chan (2008), Chen (2010), and Jalilvand et al. (2017) underscores the effectiveness of these strategies in promoting environmental stewardship while maintaining profitability and customer satisfaction. These studies highlight the transformative potential of ESPs in fostering eco-friendly hospitality practices that contribute significantly to sustainable development goals.

Green innovation (GI) consists of two essential aspects: green

product innovation (Gpro) and green process innovation (Gprc), both of which are crucial for promoting environmental sustainability. Green product innovation (Gpro) involves the creation of eco-friendly products or services aimed at reducing ecological impacts, such as energy-efficient appliances and biodegradable materials (Weng et al., 2015). On the other hand, Gprc focuses on implementing cleaner production practices, waste reduction strategies, and resource-efficient technologies to improve operational sustainability (Al-Hakimi et al., 2022). These two dimensions work together to help businesses comply with regulatory requirements, satisfy consumer preferences for sustainability, and minimize environmental impacts throughout product lifecycles. For example, the integration of Gpro and Gprc can create synergies where environmentally designed products are produced using renewable energy sources, thus enhancing overall environmental performance (Weng et al., 2015).

Research indicates that companies that invest in both Gpro and Gprc often enjoy competitive benefits, including cost reductions, enhanced brand reputation, and increased resilience over the long term (Huang and Li, 2017). Ultimately, emphasizing both Gpro and Gprc illustrates a comprehensive strategy for green innovation that balances market relevance with operational eco-efficiency (De Marchi et al., 2022). Specifically, the Gpro in hospitality encompasses strategic selection and use of materials that minimize environmental impact (Alabo and Anyasor, 2020). This approach includes prioritizing materials that generate the least pollution during their lifecycle (Dangelico and Pujari, 2010), choosing those that require minimal energy and resources for production (Shrivastava, 2018), using the fewest possible materials in product development to reduce waste (Khan et al., 2021), and ensuring that products are easily recyclable, reusable, or able to disintegrate at the end of their lifecycle (Moshood et al., 2022).

Despite burgeoning interest in individual sustainability dimensions, research remains fragmented, often examining ESPs, GI, or SE in isolation (Camilleri, 2022; Upadhyay and Vadam, 2015). While energy efficiency measures are vital for cost reduction and environmental impact mitigation, there is limited understanding of how their benefits can be further amplified through integrated stakeholder involvement (Upadhyay and Vadam, 2015). To address this gap, this study investigates how the combined application of ESPs, GI—comprising Gpro and Gprc—and SE drives PERF in hotels. Specifically, we aim to (1) examine the direct effect of ESPs on green performance, (2) assess the mediating role of GI in this relationship, and (3) evaluate how SE moderates the ESP→GI→PERF pathway, thereby amplifying sustainability outcomes.

This paper makes three primary contributions. First, it advances theoretical understanding by integrating ESPs, GI, and SE into a unified framework, thus bridging previously siloed research streams. Second, it provides empirical evidence on both the mediating role of GI and the moderating effect of SE in enhancing PERF. Third, it offers practical guidance for hotel managers on designing synergistic sustainability strategies that maximize environmental and economic gains. By presenting these insights, our study equips practitioners and scholars with a comprehensive roadmap for implementing and evaluating green initiatives in the modern hospitality sector.

2. Theoretical background and hypothesis development

This study attempted an empirical investigation of the Egyptian hospitality industry by embedding stakeholder theory and innovation diffusion theory (IDT). This framework exhibits crucial insights into how hotels can enhance their sustainability efforts and improve performance.

2.1. Stakeholder Theory

Stakeholder theory suggests that organizations should pay attention to all stakeholders' interests in organizational decision-making processes. This theory emphasizes that businesses, including hotels, commit

to involving multiple stakeholders, such as employees, customers, suppliers, and the local community, in striving for sustainable outcomes. This commitment behavior will be assisted by building collaboration and mutual responsibility among these different stakeholders, leading to enhancements in the sustainability performance of hotels and, subsequently, their overall performance (Freeman, 2010; Mondoñedo, 2021). SE is crucial for implementing ESPs in the hospitality industry. Both can support and show valuable insights into sustainability challenges and opportunities, helping hotels develop strategies aligning with business objectives and community expectations. Research indicates that effective stakeholder engagement can lead to better environmental performance and greater customer satisfaction (Amoako et al., 2021).

2.2. Innovation Diffusion Theory (IDT)

IDT, pioneered by Rogers (Rogers et al., 2014), describes the process of dissemination of new ideas and technologies within an organization. The theory can be applied in the context of hotels to understand how green innovations will be diffused as a response to ESPs (Bolici et al., 2020; Yuan et al., 2023). According to Rogers et al. (2014), the main elements in the diffusion process are the innovation itself, communication channels, social systems, and perceived attributes of the innovation.

Green Innovations (GI) will prevail and conquer for longer in upgrading the hotel industry's environmental performance, especially when it comes to energy-efficient systems or sustainable sourcing practices. The theory postulates that organizational culture, management support, and involvement of stakeholders facilitate the adoption of such innovations (Khatter et al., 2021; Yuan et al., 2023). Khatter et al. (2021) investigated the role of various stakeholders in the implementation and adoption of environmentally sustainable policies and practices (ESPPs) in the Australian hotel industry and defines that the adoption is driven by financial considerations, marketing benefits, and owner/shareholder interests but is prevented by constraints such as time pressures, resource availability, and variations in stakeholder attitudes. Yuan et al. (2023) investigate the link between business ethics diffusion and innovation performance in the tourism and hospitality industry, focusing on the mediating roles of service innovation and knowledge-sharing. This study will thus uncover the role of these two theories in the nexus of using green innovation as a mediator and stakeholder engagement as a moderator in the linkage between environmentally sustainable practices and green practices in Egyptian hotels.

2.3. Environmental Sustainability Practices(ESPs)

Environmental sustainability practices encompass a broad range of activities and strategies that aim to minimize the environmental impact of business operations (Sarkis, 2001). In the hospitality, these practices are critical not only for reducing ecological footprints but also for meeting the increasing environmental expectations of guests and regulatory bodies (Bohdanowicz, 2006). For hotels, sustainability practices such as energy efficiency measures, water conservation techniques, and waste reduction programs are essential for sustainable operations (Mensah, 2006). These initiatives directly contribute to operational cost savings and enhance the property's marketability to environmentally conscious consumers (Chan, 2008). Furthermore, adopting green certifications and integrating sustainable building designs and materials demonstrate a hotel's commitment to environmental stewardship, which can significantly enhance guest satisfaction and loyalty (Manaktola and Jauhari, 2007). Ayuso (2007) shows that sustainable practices lead to better resource management and can improve the long-term viability of hotel operations (Ayuso, 2007). Additionally, proactive engagement in environmental sustainability can serve as a differentiator in a competitive market, attracting leisure and business travelers increasingly making decisions based on CSR practices (Tzschentke et al., 2008). Moreover, studies indicate that hotels

engaging in comprehensive sustainability programs often experience improved relationships with local governments and communities, facilitating smoother operations and expansions (Ashley et al., 2007; Ngo et al., 2018; Pasape et al., 2012).

2.4. Stakeholder Engagement (SE)

Stakeholder engagement refers to the strategies and efforts organizations use to communicate and involve key groups in their operational decisions (Lehtinen and Aaltonen, 2020), which may include customers, employees, suppliers, and the local community among others (O'Riordan and Fairbrass, 2014). In the hospitality industry context, effective SE is crucial as it directly influences reputation, customer loyalty, and operational success (Jalilvand et al., 2017). For hotels, actively engaging stakeholders can lead to enhanced sustainability initiatives, improved service quality, and stronger community relations (Farmaki, 2019). Bhattacharya and Sen (2003) highlights that companies engaging stakeholders with genuine concern and transparent practices can significantly boost their brand perception and customer loyalty. Specifically, engaging employees in decision-making and sustainability programs in hotels leads to higher job satisfaction and better service outcomes, which are critical for guest satisfaction and improved business (Holcomb et al., 2007). Furthermore, involving local communities and suppliers in the hotel's sustainability efforts can strengthen local economic ties and ensure the long-term viability of environmental strategies, proving that stakeholder engagement is integral to operational efficiency and sustainable growth (Cvelbar and Dwyer, 2013).

2.5. Green Innovation (GI)

Green innovation refers to developing and implementing new technologies, processes, and practices to enhance environmental sustainability (Tseng et al., 2013). In the hospitality industry, GI is increasingly seen as a vital component of operational strategy, influencing not only environmental outcomes but also financial performance and customer satisfaction (Chen, 2010). Hotels are adopting innovative green technologies such as energy-efficient HVAC systems, water recycling processes, and intelligent lighting systems, which significantly reduce energy and water consumption (Han et al., 2010). Moreover, integrating sustainable architectural designs and using eco-friendly materials in hotel construction and renovations are examples of how GI can align with aesthetic and functional needs while minimizing environmental impacts (Serrano Baena, 2023). Green innovation can be considered the missing link between ESPs and green performance, translating sustainable practices into performance outcomes. For example, if energy conservation measures are one of the environmental sustainability practices adopted by hotels, green innovation may facilitate effective implementation of such practices, leading to improved operational efficiencies and enhanced environmental performance. For example, the research among hotel employees showed that green transformational leadership and green HRM practices are positively related to environmental performance because they enhance eco-innovation. This study underscores how leadership and HR practices may drive green innovation, influencing sustainability outcomes (Surya et al., 2024). Another study also established a significant association between green innovation and green practices among hotels within the city. Strong association in such cases suggests that effective implementation of green innovations has better outcomes of environmental sustainability (Chivandi et al., 2023).

Green innovation, includes green product innovation (Gpro) aimed at creating environmentally friendly products to lessen ecological impacts and green process innovation (Gprc) focused on sustainable production techniques and resource efficiency, allows companies to comply with regulations, satisfy sustainability-oriented consumer preferences, and mitigate environmental effects (Huang and Li, 2017).

These innovative practices help hotels reduce operational costs and

enhance their competitive edge in a market where consumers are increasingly drawn to eco-friendly businesses (Hornig et al., 2017). Additionally, hotels that pioneer in adopting green innovations often gain benefits in terms of regulatory compliance, easier access to green financing, and improved brand image, which can attract new customer segments and increase market share (Kasim, 2009). The proactive approach to green innovation fosters stronger relationships with stakeholders, including investors increasingly looking for sustainable investment opportunities (Manaktola and Jauhari, 2007). Research further suggests that green innovation serves not only as a tool for environmental management but also as a strategic asset that can lead to new opportunities for service differentiation and value creation in the hospitality sector (Chan and Hawkins, 2010; Hsiao and Chuang, 2016; Kuo et al., 2022).

2.6. Green Performance (PERF) in the Hospitality Domain

Hotel performance traditionally focuses on financial metrics such as revenue per available room (RevPAR), occupancy rates, and profit margins (Remy et al., 2023). However, in the context of increasing environmental and social awareness, performance metrics now also encompass sustainability achievements and their impact on the overall business health (Singh et al., 2014). In the hospitality industry, sustainable practices have been shown to positively influence green performance by reducing costs through efficient resource use and enhancing customer satisfaction and loyalty through green branding (Zhang et al., 2012).

Adopting environmental sustainability practices can lead to improved operational efficiencies, such as lower energy and water consumption, directly decreasing operating costs and improving profitability (Kularatne et al., 2019). Furthermore, hotels that are actively engaged in environmental stewardship often experience a boost in their public image and attract a growing segment of environmentally conscious consumers (Molina-Azorín et al., 2009). This positive reputation contributes to competitive advantage and can drive higher occupancy rates and pricing premiums (Cheng et al., 2006). Moreover, the integration of sustainable practices and green innovations in hotels is increasingly recognized by industry awards and certifications, which serve as additional marketing tools that enhance performance (Tzschentke et al., 2008). These certifications validate a hotel's environmental efforts and reassure potential guests of the property's commitment to sustainability, which can be a deciding factor in hotel selection for eco-conscious travelers (Han et al., 2010).

2.7. Hypotheses Development

2.7.1. Environmental Sustainability Practices and Green Performance

Green performance in the current hospitality landscape is a complex amalgam that now extends beyond mere financial outcomes to include a wider array of sustainability-driven measures (Sajid and Ertz, 2024), reflecting an industry that is adapting to the more conscientious predilections of contemporary society (Nogueira, 2023). Hotel performance transcends traditional financial metrics such as occupancy rates, average daily rate (ADR), and revenue per available room (RevPAR), extending into areas of customer satisfaction, brand reputation, and now, increasingly, sustainability performance (Rogers, 2019). Le et al. (2021) illuminate that hotel performance in the modern age is intricately linked with customer perceptions of service quality and their overall experience. Furthermore, Sigala (2018) emphasizes the evolving nature of hotel performance indicators, suggesting that hotels that excel in sustainable practices often see enhanced customer loyalty and a stronger brand image, which can lead to improved financial performance.

In addition, Zhang et al. (2012) posits that hotels that effectively manage and execute sustainable operations not only see cost savings due to efficiency improvements but can also command higher price premiums, thereby directly impacting their bottom line. According to

Kucukusta et al. (2013), hotels that actively participate in community welfare and environmental conservation efforts report an increase in customer satisfaction and are often rewarded with increased business. Langgat et al. (2023) brought to light the substantial impact that environmental sustainability practices exert on the multifaceted aspects of hotel performance, suggesting that ease of use and top management support are the key determinants of adopting sustainable practices and conservation projects. Cvelbar and Dwyer (2013) highlighted the strategic significance of sustainability in the context of Slovenian hotels, the findings of the study underscored that the implementation of environmental sustainability practices is a key driver in boosting hotel performance and generating stakeholder value.

Organizations support their local communities often see multiple benefits (Vargas-Hernández et al., 2023). This support can take many forms, such as local hiring, engaging in regional development projects, or sponsoring local events. The tangible benefits of such initiatives include enhanced community relations, which can lead to a more stable operating environment (Stanitsas et al., 2021). Intangible benefits might consist of increased brand loyalty and positive public perception, critical in times of market uncertainty or regulatory scrutiny. In addition, Zhang et al. (2020) demonstrate that community support initiatives positively correlate with improved stakeholder relationships and can lead to enhanced financial performance. Implementing effective waste management strategies is another core component of ESPs. Organizations that adopt advanced waste reduction, recycling, and reuse practices reduce their environmental impact and often see cost reductions and increased operational efficiency (Howard et al., 2022). Furthermore, regulatory compliance regarding waste can prevent legal issues and fines, while innovative waste management can serve as a basis for corporate leadership in sustainability (Puntillo, 2023). Porter and Linde (1995) argued that such environmental improvements could lead to a "win-win" scenario, where environmental and economic benefits go hand-in-hand. Participation in conservation efforts, whether through direct action or partnerships with environmental organizations, helps preserve natural resources and biodiversity, which are vital for sustaining long-term ecological balance (Jhariya et al., 2022). These projects can improve the ecosystem services that benefit organizations, like water purification and climate regulation, which are crucial for industries such as agriculture, forestry, and fisheries. The goodwill generated by these efforts can also enhance customer satisfaction and employee morale (Esthi and Setiawan, 2023), as noted by (Bansal and Roth, 2000), who found that firms with proactive environmental strategies often outperform their less proactive peers in the long run. Hence, the first hypothesis is:

H1: Environmentally sustainable practices have a significant effect on Green performance.

2.7.2. Environmental Sustainability Practices and Green Innovation

Environmental sustainability practices in the hotel industry are pivotal for reducing ecological footprints (Srivastava et al., 2024) and act as a catalyst for fostering green innovation (Makhloufi et al., 2020). These practices involve comprehensive strategies ranging from energy efficiency to waste management and sustainable sourcing, which fundamentally drive innovation within hotel operations. Bohdanowicz et al. (2011) highlights that ESPs can stimulate the adoption of innovative technologies and sustainable processes, which are crucial for environmental conservation and operational efficiency. Similarly, Jones et al. (2014) suggest that the implementation of ESPs are often associated with enhanced corporate reputation and operational innovations, leading to sustainable competitive advantages. Furthermore, Chan and Ho (2006) underlines the significant role that ESPs play in influencing not just operational tactics but strategic innovations, with hotels increasingly leveraging these practices to attract eco-conscious consumers and differentiate themselves in the marketplace. The findings by Mihalic (2016) reinforce this, indicating that hotels committed to sustainability are more likely to engage in groundbreaking green

innovations, thus meeting the evolving preferences of travelers and gaining a larger share of the market. The positive repercussions of environmental sustainability practices are extensive, influencing not just a hotel's immediate environment but also shaping industry standards and guest expectations. Hence, the second hypothesis is:

H2: Environmentally sustainable practices exert a significant effect on green innovation.

2.7.3. Green Innovation as Mediator

Green innovation within the hospitality sector represents a commitment to progress that does not compromise the well-being of the planet (Langgat et al., 2023). It includes a wide array of practices, from implementing cutting-edge, resource-efficient technologies to adopting radical new business models that prioritize sustainability (Almusaed et al., 2023). Weng et al. (2015) provide compelling evidence that green innovation is not merely a peripheral activity but a core component of organizational performance that aligns with contemporary environmental and corporate imperatives.

In the context of the hospitality, GI can be conceptualized as comprising two major components: Gpro and Gprc, each with distinct dimensions that facilitate environmental sustainability (Khan et al., 2021). Gpro refers to the development of products that minimize environmental impacts through their life cycle, from design to disposal (Sarkar et al., 2022). This aspect of innovation focuses on four key dimensions: selecting materials that cause minimal pollution (Gpro1), using materials that require minimal energy and resources (Gpro2), minimizing the use of materials (Gpro3), and enhancing product recyclability and reusability (Gpro4). These dimensions ensure that the products not only contribute to sustainability but also adhere to the principles of circular economy (Bohdanowicz, 2006; Chan, 2008). On the other hand, Gprc involves the adoption of new or significantly improved production processes that contribute to environmental protection. This includes the implementation of energy-efficient technologies, reduction in waste production, and the use of renewable energy sources. The dimensions of Gprc can be categorized into energy efficiency improvements, waste minimization, and the adoption of environmentally friendly processes (Chen (2010) and Han et al. (2010)). Both types of innovation play a crucial role in enhancing the PERF of a firm, acting as mediators between ESPs and SE to improve overall environmental outcomes (Lehtinen and Aaltonen, 2020; Jalilvand et al., 2017). By integrating Gpro and Gprc, hospitality businesses can significantly reduce their ecological footprints while engaging stakeholders in meaningful ways.

The role of green innovation in the relationship between environmentally sustainable practices and green performance is a critical area of interest. Studies by Chan and Hawkins (2010) demonstrate that the introduction of green innovation, driven by environmentally sustainable practices, leads to significant operational efficiencies, reductions in costs, and an increase in guest satisfaction due to enhanced service quality and reputation. Similarly, Bohdanowicz et al. (2011) found that environmental innovations resulting from sustainability practices can substantially improve resource efficiency, which in turn enhances overall hotel performance. According to Singh et al. (2014), hotels that implement cutting-edge green technologies often see a direct improvement in their performance indicators, such as energy savings, cost reduction, and an enhanced competitive edge. Huang and Li (2017) further illustrate that GI, particularly those that are customer-facing, can significantly enhance guest perceptions of a hotel, leading to increased satisfaction and increased productivity in business. Hence, the third and fourth hypotheses are:

H3: Green innovation directly enhances Green performance.

H4: Green innovation mediates the relationship between Environmentally sustainable practices and Green performance.

2.7.4. Stakeholder Engagement as Moderator

Stakeholder engagement in the hospitality sector embodies a

strategic approach that aligns the interests of various groups—ranging from investors, employees, and customers to local communities and suppliers—with the hotel's operational objectives (Farmaki, 2019). The role of stakeholders in adopting and succeeding sustainability practices cannot be overstated. As Irungu et al. (2022) illuminate, active collaborations with stakeholders have been pivotal in successfully integrating green practices within hotel operations in the context of star-rated hotels. Such engagements extend beyond mere consultation, inviting stakeholders to participate in decision-making processes (Talley et al., 2016), thus fostering a sense of ownership and commitment towards the hotel's environmental goals (Raub and Martin-Rios, 2019).

Research highlights the critical role of stakeholder engagement in amplifying the positive outcomes of environmentally sustainable practices on green performance. According to Jones et al. (2014), hotels that actively engage stakeholders in their sustainability strategies often see enhanced results due to increased buy-in and support, which translates into better implementation and more effective operational changes. Greater involvement by stakeholders in ESPs could make them more effective drivers of green performance. Indeed, hotels involving all stakeholders in sustainability-related initiatives—employees, guests, suppliers, and the community gain better access to various resources and diverse perspectives, resulting in improved environmental performance. A recent study focused on sustainable environmental management practices among Malaysian hotels concluded that the participation of stakeholders played a crucial role in implementing effective ESPs. The findings revealed that hotels with higher stakeholder involvement fared better regarding the realization of outcomes on sustainability and, therefore, increasing green performance (Rassiah et al., 2024). These interests and contributions may generate harmonious effects that reinforce each other in the direction of value creation from sustainable practices. For example, guest preference for greener choices incentivizes hotels to implement stronger measures towards sustainability, resulting in improved performance (Manaktola and Jauhari, 2007).

The influence of stakeholder engagement on the relationship between environmentally sustainable practices and green innovation is also significant (Hossain et al., 2022). Tzschentke et al. (2008) assert that stakeholder involvement is crucial in developing and deploying innovative green technologies and practices. When stakeholders are actively engaged, they are more likely to support and participate in innovative initiatives, providing resources, ideas, and feedback that enhance the development and application of green innovation (Goodman et al., 2017). Stakeholder engagement also impacts the degree to which hotels can translate ESPs into green innovations. Engagement with stakeholders builds a work-centric culture of cooperation and mutual responsibility, which is very important in driving innovation. A study of green practices among star hotels in Hyderabad found that the involvement of stakeholders influences the adoption of innovative environmental practices. The results indicated that hotels with higher levels of stakeholder engagement were more likely to implement green innovations that align with their sustainability goals (Behera, 2018). Stakeholders have plausible chances to give valuable insights into customer preferences and emerging trends, empowering hotels to innovate more effectively. Feedback from guests regarding sustainability initiatives can guide hotels in emerging new eco-friendly services or products (Rassiah et al., 2024).

The moderation of stakeholder engagement between green innovation and green performance (PERF) is evident as stakeholders' support for green innovation significantly influences how these innovations impact green performance. According to Bohdanowicz et al. (2011), hotels that engage stakeholders in their green initiatives often experience a positive reception and increased support and enhance these innovations' effectiveness in improving operational efficiencies and customer satisfaction. Research has demonstrated that involving stakeholders in the innovation process will lead to the realization of green innovations that are more successfully implemented and accepted by employees and customers. This acceptance translates into improved

operational efficiencies and enhanced environmental performance (Bohdanowicz, 2005). Hotels at the forefront of engaging the local community in sustainability initiatives have demonstrated better green performance indicators. These initiatives also help improve operational practices and add to the hotel’s reputation as environmentally sensitive, thereby enhancing the consumer base (Farmaki et al., 2014). Hence, the subsequent hypotheses (fifth, sixth and seventh) are:

H5: Stakeholder engagement moderates the relationship between environmentally sustainable practices and Green performance.

H6: Stakeholder engagement will moderate the relationship between environmentally sustainable practices and Green innovation.

H7: Stakeholder engagement moderates the relationship between Green innovation and Green performance.

3. Methods

The investigation utilizes a quantitative survey design, collecting data from Egypt’s 5-star hotel staff through a Google Forms-created questionnaire. We selected Cairo and Sharm El-Sheikh for this study because these cities are key tourism hubs in Egypt, hosting a significant number of 5-star hotels that exemplify high-performance in the hospitality sector. These cities are also strategic centers for economic activity and tourism, making them ideal for examining the impact of environmental sustainability practices and green performance. This kind of methods are found in other previous studies as well (Khalifa et al., 2025; Zaki and Elnagar, 2024; Elshaer et al., 2024). The survey, translated into Arabic for Egyptian hotel personnel, underwent a pre-testing process (Olson, 2010) to ensure its validity and sensitivity to modifications and bias issues. A hotel deputy director then reviewed the draft instrument for content validity and clarity, providing targeted feedback on wording and structure. One week before the main survey, the revised questionnaire was administered to 45 hotel employees to assess item intelligibility and response consistency. This pre-test led to minor wording adjustments, enhancing overall reliability and ensuring the instrument suited employees across different organizational levels.

3.1. Data collection and sampling

Sampling commenced with the choice of sample size and data collection procedures targeting hotels in Cairo and Sharm El-Sheikh. We chose these cities because they represent the core of Egypt’s luxury hospitality market and have diverse 5-star hotels that are influenced by both local and international best practices. Initially, online questionnaires and study goals were sent to the HR managers of all 5-star hotels in these locations. Out of those contacted, 45 hotels participated in the study, and their HR managers agreed to provide employee lists. We then implemented a systematic random sampling technique by assigning each employee a unique number from the provided lists and selecting

every kth employee to participate. This ensured a representative sample across various departments and organizational levels, rather than relying solely on responses from HR managers, which could have skewed the data toward strategic-level perspectives. To achieve a decent response rate, we employed multiple follow-up reminders and provided clear instructions to participants, emphasizing the importance of their input. We also reassured potential respondents about the anonymity and confidentiality of their responses, which encouraged honest and unbiased participation. Data collection took place over a period of one month by July 2023 to allow sufficient time for responses and follow-up communications. Of the 450 invitations, 273 completed the survey (60.7 percent response rate). We then screened responses for multivariate outliers using Mahalanobis distance at a significance threshold of $p < 0.001$, which led to the removal of 37 cases. The resulting 236 valid cases were sufficient for PLS-SEM analysis (Hair et al., 2020). This systematic and structured sampling approach ensured that the sample was diverse and representative of the target group, thereby enhancing the validity and reliability of the research findings. Including the detail of 45 hotels helps illustrate the scope and representativeness of the sample, thereby enhancing the validity and reliability of the research findings. Ethical considerations were a priority throughout the study. Prior to data collection, the research protocol was reviewed and approved by our institutional review board. All participants were provided with an informed consent form that outlined the purpose of the study, ensured confidentiality of responses, and stated that participation was entirely voluntary. Additionally, the data collection process was conducted in compliance with ethical guidelines to protect participants’ privacy and data integrity.

Regarding the choice of analytical software, we selected SmartPLS for several reasons. SmartPLS is well-suited for our research design because it efficiently handles complex models with multiple constructs, even when the sample size is moderate. Its capability to process both reflective and formative constructs, coupled with its robust bootstrapping procedure for significance testing and its tolerance for non-normal data distributions, makes it an ideal tool for our study. This ensures that our analytical results are both reliable and valid, thereby enhancing the overall rigor of our research.

Given our reliance on self-reported survey data, responses may be subject to social desirability bias and common method variance. To mitigate these risks, we emphasized respondent anonymity, randomized item order, and used both positively and negatively worded statements. Nevertheless, future research could incorporate objective performance metrics (e.g., energy-use logs, third-party audits) or multi-source data (e.g., guest satisfaction scores, managerial assessments) to further validate and triangulate self-reported measures.

3.2. Measures

We measured ESPs using nine items adapted from Langgat et al.

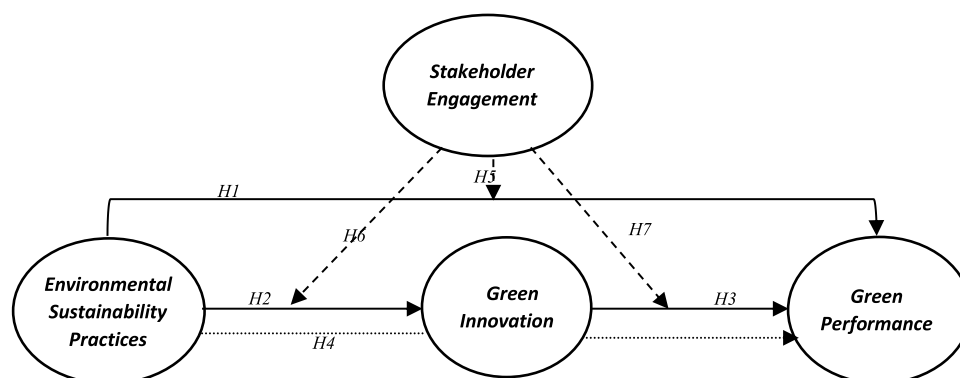


Fig. 1. Theoretical framework.

(2023) and Mensah, Blankson, (2013)). ESPs comprised three dimensions: Support for Host Community (S1–S3), Waste Management (W1–W3), and Conservation Projects (C1–C3). Support for Host Community captures hotel initiatives such as regional sourcing, community development partnerships, and preservation of local culture. Waste Management items assess practices to reduce waste generation, enhance recycling, and implement composting. Conservation Projects focus on long-term environmental programs such as habitat restoration and resource conservation.

Green Innovation (GI) was operationalized via two reflective dimensions—Green Product Innovation (GPro1–GPro4) and Green Process Innovation (GPrC1–GPrC4)—adapted from Chen et al. (2006) and Weng et al. (2015). GPro items pertain to the development of eco-friendly amenities, sustainable food offerings, and energy-efficient appliances, while GPrC items cover cleaner production processes, waste minimization strategies, and water-saving technologies.

Stakeholder Engagement (SE) was measured with five items (SE1–SE5) adapted from Wachira et al. (2022). These items assess hotel efforts to involve employees, suppliers, guests, and local communities in sustainability decision-making and feedback processes.

Green Performance (PERF) employed five items (PERF1–PERF5) drawn from Nhat et al. (2020), capturing both environmental outcomes (e.g., reduced energy and water use) and economic benefits (e.g., cost savings, enhanced reputation).

All constructs utilized a five-point Likert scale (1 = “Strongly disagree” to 5 = “Strongly agree”).

Regarding measurement quality assessment, we assessed reliability via Cronbach’s alpha ($\alpha > 0.70$) and composite reliability ($CR > 0.70$). Convergent validity was confirmed with average variance extracted ($AVE > 0.50$) for all constructs. Discriminant validity was established using the Fornell–Larcker criterion and the HTMT ratio (< 0.90). To address common method bias, we conducted Harman’s single-factor test, which showed that a single factor did not explain the majority of variance ($< 40\%$), indicating that common method variance is not a serious concern.

(Table 3).

4. Results

4.1. Respondent’s profile

Table 1 displayed the study’s analyzed 236 employees’ demographics, revealing a higher gender breakdown (180,76.3 % males)

Table 1
Demographic characteristics.

Variables		Frequency
Gender	Female	56
	Male	180
Age	< 25	6
	25–35	150
	35–45	50
	45–55	20
	> 55	10
School	Primary/secondary	3
	High school	20
	University	200
	Master/PhD	13
Position	Hotel Management	200
	Department heads	10
	Supervisor	26
Experience	Less than 5 years	50
	5–10 years	150
	More than 10 years	36
Marital status	Single	100
	Married	100
	Divorced/widow	36
Total		236

compared to 56,23.7 % females. The largest age group was 25–35 (150,63.6 %), followed by 35–45 (50,21.2 %). The majority had completed a university degree (200,84.7 %), with a smaller percentage having primary/secondary education (3.3 %) or a Master/PhD degree (13,5.5 %). The study found that hotel management was the most common role, followed by supervisors and department heads. Experience levels varied, with a significant number having 5–10 years of experience. Marital status was evenly distributed, with 42.4 % of participants being single, 42.4 % married, and 15.3 % divorced or widowed.

4.2. Inner model

The inner model assessment began with tests for common method variance (CMV) and non-response bias. To address CMV, we conducted Harman’s single-factor test, which revealed that the largest factor accounted for only 32.7 percent of the variance, indicating that CMV is not a significant concern (Henseler et al., 2015). Non-response bias was evaluated by comparing early versus late respondents using independent-samples *t*-tests on all key constructs; no significant differences were found, suggesting that our 60.7 percent response rate did not introduce bias.

Next, we examined second-order constructs using a hierarchical component model (HCM) in SmartPLS 3. All first- and second-order factor loadings exceeded 0.70 and demonstrated satisfactory composite reliability ($CR \geq 0.85$), confirming the robustness of our measurement structure.

The following table shows the main correlations among study factors. We checked data normality using skewness and kurtosis (Hair et al., 2020). Table 2 displayed the results of a descriptive analysis for various constructs. A detailed examination was carried out to investigate different aspects related to sustainable practices in hospitality. Support for the host community was found to have a high mean score of 4.8 (SD = 0.6) and a *t*-value of 18.2. Waste management showed moderate emphasis with a mean score of 3.9 (SD = 0.8) and a *t*-value of 14.9. Conservation projects received considerable attention, scoring a mean of 4.2 (SD = 0.8) and a *t*-value of 12.8. Gpro demonstrated notable efforts, with a mean of 4.1 (SD = 0.8) and a *t*-value of 13.8. Gprc had ongoing initiatives with a mean score of 3.8 (SD = 0.9) and a *t*-value of 14.9. SE implied active involvement, achieving a mean score of 3.8 (SD = 1.0) and a *t*-value of 15.2. Lastly, PERF was commendable, scoring a mean of 4.3 (SD = 0.7) and a *t*-value of 16.4. Furthermore, measures of kurtosis and skewness were assessed, revealing different distributional characteristics among the constructs. These results offer valuable insights into the current status of ESPs in the hospitality sector. Notable relationships ($p < 0.05$) were highlighted, indicating significant associations between the constructs.

The measurement model statistics from Table 3 indicate strong reliability and validity for each construct. For S, W, C, Gpro, Gprc, SE, and PERF, Cronbach’s alpha coefficients range from 0.838 to 0.966, demonstrating high internal consistency. Factor loadings for individual items range from 0.755 to 0.954, indicating substantial relationships between items and their respective constructs. Average Variance Extracted (AVE) values range from 0.681 to 0.845, surpassing the recommended threshold of 0.5, indicating convergent validity. Composite Reliability (CR) values range from 0.927 to 0.970, exceeding the threshold of 0.7, further confirming reliability. Additionally, the Variance Inflation Factor (VIF) values, ranging from 1.028 to 2.35, suggest no issues of multicollinearity. Therefore, these statistics affirm the robustness of the measurement model in accurately capturing the intended constructs. Overall, the constructs exhibit satisfactory reliability and validity, as indicated by the model fit indices.

Table 4 presents an analysis of discriminant validity using the Fornell–Larcker criterion and Heterotrait–Monotrait (HTMT) ratios (Hair et al., 2020). The role of discriminant validity is crucial as it reveals the strength of correlations between constructs and highlights their

Table 2
Descriptive analysis.

Constructs	M	SD	t	Kurtosis	Skewness	S	W	C	Gpro	Gprc	SE	PERF
Support for host community (S)	4.8	0.6	18.2	2.399	-2.11	1.0						
Waste management (W)	3.9	0.8	14.9	1.357	-1.28	.49 *	1.0					
Conservation projects (C)	4.2	0.8	12.8	2.87	-0.787	.59 *	.68 *	1.0				
Green product innovation (Gpro)	4.1	0.8	13.8	3.18	-2.28	.68 *	.69 *	.73 *	1.0			
Green process innovation (Gprc)	3.8	0.9	14.9	3.21	-1.19	.50 *	.58 *	.59 *	.55 *	1.0		
Stakeholder engagement (SE)	3.8	1.0	15.2	2.39	-2.10	.57 *	.69 *	.70 *	.70 *	.51 *	1.0	
Green performance (PERF)	4.3	0.7	16.4	2.19	-1.17	.59 *	.65 *	.62 *	.66 *	.55 *	.74 *	1.0

Table 3
Factor loadings and model fit indices.

Construct	code	Items	Loadings	α	CR	AVE	VIF
Support for host community (S)	S1	Use of local materials	0.814	0.913	0.927	0.681	1.028
	S2	Purchases from local sources	0.810				
	S3	Improvement of lives of local residents by ploughing back profit	0.755				
Waste management (W)	W1	Composting of waste	0.927	0.930	0.970	0.845	1.29
	W2	Implementation of recycling program.	0.927				
	W3	Reuse of papers, cans, bottles and plastic	0.821				
Conservation projects (C)	C1	Use of energy-efficient equipment and products	0.818	0.886	0.950	0.762	1.31
	C2	Installation of water-efficient devices and equipment	0.870				
	C3	Prescription of environmental standards for suppliers	0.852				
Green product innovation (Gpro)	Gpro1	The hotel chooses the materials of the product that produce the least amount of pollution for conducting the product development or design	0.864	0.919	0.953	0.771	1.35
	Gpro2	The hotel chooses the materials of the product that consume the least amount of energy and resources for conducting the product development or design	0.882				
	Gpro3	The hotel uses the fewest amount of materials to comprise the product for conducting the product development or design	0.844				
	Gpro4	The hotel would circumspectly deliberate whether the product is easy to recycle, reuse, and decompose for conducting the product development or design	0.924				
Green process innovation (Gprc)	Gprc1	The manufacturing process of the hotel effectively reduces the emission of hazardous substances or waste	0.821	0.838	0.943	0.761	2.35
	Gprc2	The manufacturing process of the hotel recycles waste and emission that allow them to be treated and re-used	0.811				
	Gprc3	The manufacturing process of the hotel reduces the consumption of water, electricity, coal, or oil.	0.854				
	Gprc4	The manufacturing process of the hotel reduces the use of raw materials	0.854				
Stakeholder engagement (SE)	SE1	Our key stakeholders convey their perspectives about how to solve the hotels green practices problems successfully	0.918	0.966	0.933	0.735	1.64
	SE2	Our key stakeholders provide new ideas for improving green practices	0.794				
	SE3	Our key stakeholders participate in defining green practices performance indicators a hotel should use and report on	0.847				
	SE4	Our key stakeholders participate in identifying green policies, objectives and programs	0.850				
Green performance (PERF)	PERF1	Employees know the specific environmental targets, goals and responsibilities	0.817	0.919	0.944	0.773	1.62
	PERF2	Employee's environmental behavior and contributions to hotels' environmental performance are assessed	0.846				
	PERF3	Providing regular feedback to employees or teams to achieve environmental goals or improve hotel's environmental performance	0.892				
	PERF4	Achievement of environmental goals is seen as one of the criteria in system of employee performance appraisal	0.915				
	PERF5	Roles of managers in achieving environmental outcomes included in appraisals	0.921				

Table 4
Discriminant validity.

Fornell-Larcker	S	W	C	Gpro	Gprc	SE	PERF
S	0.99	0.22	0.32	0.09	0.08	0.23	0.09
W		0.96	0.29	0.01	0.02	0.12	0.09
C			0.89	0.01	0.03	0.13	0.18
Gpro				0.96	0.52	0.09	0.07
Gprc					0.87	0.11	
SE						0.81	0.18
PERF							0.92
HTMT	S	W	C	Gpro	Gprc	SE	PERF
S	.96						
W	.51	.92					
C	.48	.57	.86				
Gpro	.52	.62	.42	.89			
Gprc	.45	.32	.25	.54	.87		
SE	.60	.53	.50	.50	.44	.89	
PERF	.33	.40	.42	.60	.42	.42	.99

Note: Diagonal values are denoted for square root of AVE.

distinctiveness, essential for ensuring the validity of the measurement model. In the Fornell-Larcker matrix, diagonal values represent each construct's square roots of the Average Variance Extracted (AVE). These values should exceed the off-diagonal correlations to establish discriminant validity. Additionally, the HTMT ratios measure the strength of relationships between constructs, with values below 0.85 indicating discriminant validity (Henseler et al., 2015).

4.3. Outer model

In the structural evaluation, we employed **bootstrapping** with 1000 resamples in SmartPLS 3 to test all hypothesized paths., as shown in Fig. 2. The internal factors accounted for about 41 % and 51 % of the changes in the external factors (GI construct 'Gpro, Gprc' and PERF dimension), signifying robust constructs To evaluate the overall fit of the model, we performed a confirmatory factor analysis (CFA) within the SEM framework. The fit indices obtained were compared against established thresholds: the Chi-square to degrees of freedom ratio

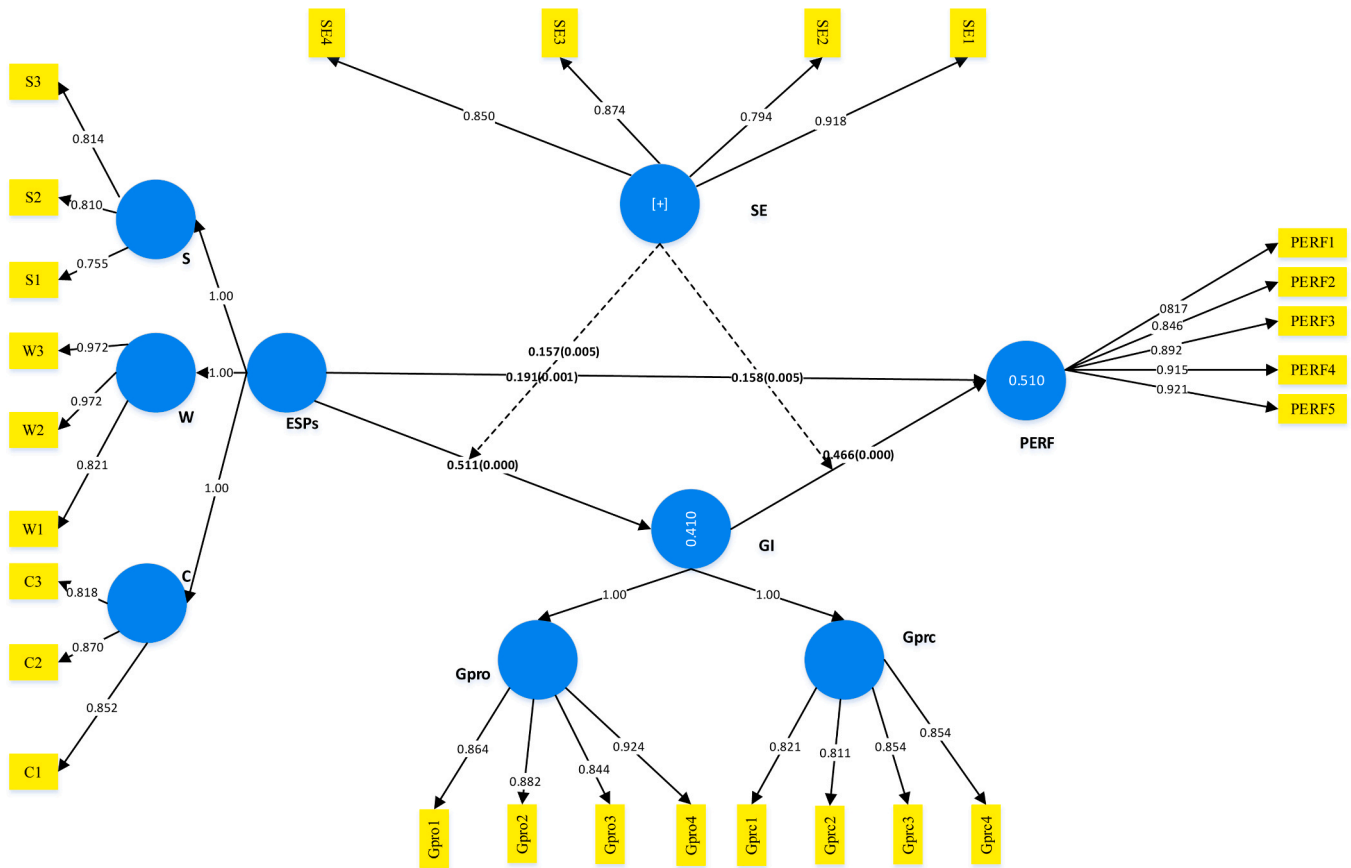


Fig. 2. Structural model.

(χ^2/df) was 488.42/194, approximately 2.52 (acceptable if < 3); the root mean square error of approximation (RMSEA) was 0.069 (acceptable if < 0.08); the standardized root mean square residual (SRMR) was 0.054 (acceptable if < 0.08); the goodness-of-fit index (gfi) was 0.996 (acceptable if ≥ 0.90); the comparative fit index (CFI) was 0.997 (acceptable if ≥ 0.95); the incremental fit index (IFI) was 0.997 (acceptable if ≥ 0.95); and the tucker-lewis index (TLI) was 0.997 (acceptable if ≥ 0.95). All indices fell within the recommended ranges, indicating a well-fitting model (Henseler et al., 2015). Furthermore, path coefficients, along with t-values (all > 1.64) and p-values (< 0.01), confirmed the statistical significance of each proposed relationship (Henseler et al., 2015).

4.4. Hypotheses testing

In the structural model (Fig. 2), PERF is significantly affected by ESPs with a coefficient of $\beta=0.191$ and a p-value of less than 0.001. This finding supports (H1). Hypothesis 2 is confirmed by the significant path coefficient between ESPs and GI, which is $\beta=0.0511$ with a p-value less than 0.001. Furthermore, H) is validated by the significant path coefficient between GI and PERF, indicated by $\beta=0.466$ and a p-value of less than 0.000. These results suggest that increased levels of ESPs and GI indicators (Gpro and Gprc) are associated with higher performance levels. Consequently, it can be concluded that all hypotheses (H1, H2, and H3) are accepted.

Empirical findings of this research (Table 5) indicate that GI indicators (Gpro and Gprc) play a full mediating role in the relationship between ESPs and PERF. Consistent with Hair et al. (2020) recommendations, there were examined all regression coefficients (direct/indirect effects) and it was found that the path direction is statistically significant. Therefore, Gpro and Gprc partially mediate the ESPs and PERF

Table 5
Mediation analysis.

H	Mediation Path direction	Indirect effects	P-value	Lower bound 95 %	Upper bound 95 %	Mediation
H5	ESPs -> GI -> PERF	0.031	0.001	0.018	0.14	√

linkage, supporting h4. The R² for all GI factors was 0.410, representing the proportion of the variance in the dependent variable (PERF) that is predictable from the independent variables. In this context, an R² value of 0.410 for all GI factors indicates that these factors collectively explain 41.1 % of the variance in the outcome. Similarly, an R² value of 0.510 for all PERF items suggests that these items collectively explain 51 % of the variance. These R² values provide insights into the predictive power of GI factors and the dependent variables in the mediation analysis.

Table 5 presents the indirect effect of ESPs on PERF via GI. The indirect effect is 0.031 ($p=0.001$, 95 % CI [0.018, 0.140]), and the variance accounted for (VAF) is 35 percent, indicating a partial mediation of moderate strength (VAF between 20 % and 80 %). This suggests that while ESPs exert a direct influence on PERF, a meaningful portion of their impact operates through GI.

As shown in Table 6 and Fig. 3, Stakeholder Engagement (SE) significantly moderates the ESPs→PERF relationship ($\beta=0.122$, $t=2.021$, $p=0.004$). The interaction effect size (f^2) for SE is 0.056, which constitutes a small to moderate effect according to Cohen's thresholds ($f^2=0.02$ small, 0.15 medium). This indicates that higher SE modestly amplifies the positive impact of ESPs on PERF, demonstrating a context-dependent enhancement of green performance under strong stakeholder involvement. As a result, (H6, and H7) were strongly

Table 6
Moderation effect with collinearity test.

Model		Unstandardized	Standard Error	Standardized	t	p	Collinearity Statistics	
							Tolerance	VIF
H7 ₀	(Intercept)	3.734	0.074		50.425	< .001		
	(Intercept)	1.329	0.925		1.437	0.152		
H7 ₁	GI	-0.307	0.225	-0.176	-1.367	< .001	0.123	1.109
	SE	0.365	0.278	0.276	1.315	< .001	0.046	1.577
	GI × SE	0.122	0.060	0.591	2.021	0.004	0.024	2.906

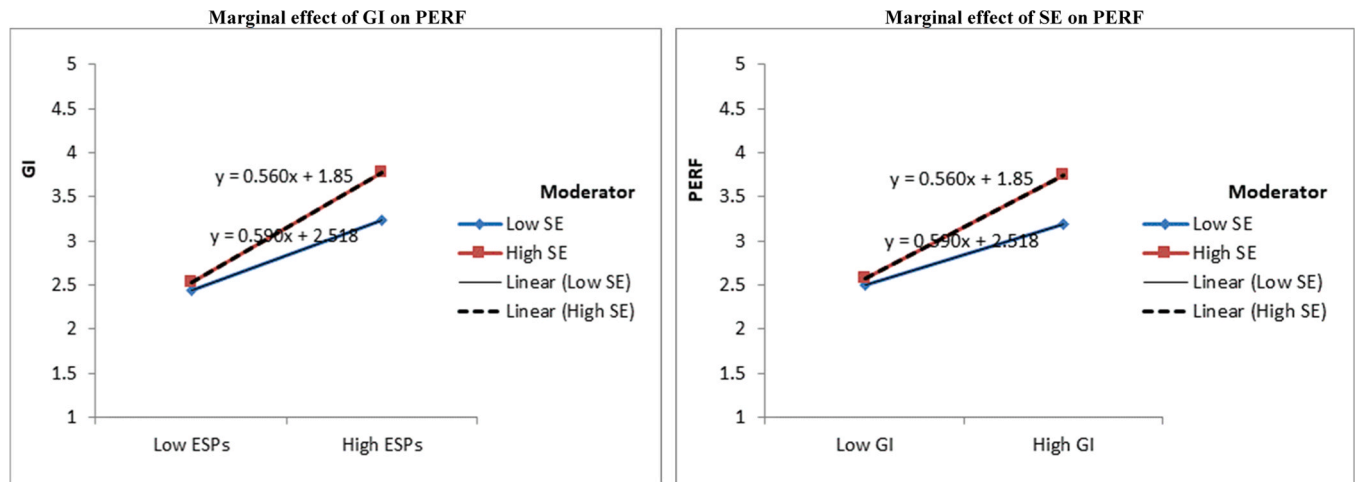


Fig. 3. The moderation effect of SE on the ESPs-PERF link.

supported.

The goal of this study is to examine the mediating role of GI and the moderating role of SE in the impact of ESP on PERF in Egypt's 5-star hotels. This analysis adopted a quantitative approach from staff of Egypt's 5-star hotels.

The findings have a significant contribution both for managers and future researchers, the results proved that green performance and green innovation are positively and significantly influenced by environmental sustainability practices (support for host community, waste management, and conservation projects), which is corroborated by studies like that of [Horg et al. \(2017\)](#), who found that eco-innovations contribute to sustainable competitive advantages in hospitality sector. Consumers' claim for sustainable hospitality practices fuels the adoption of ESPs among hotels. Guests increasingly tend to choose accommodation based on environmental credentials, and such a phenomenon could lead to improved reputation and customer loyalty. Hence, with increasing ESPs implemented by hotels, their green performance is likely to rise due to consumer expectations. Most regions have enacted regulations coupled with incentives tending toward making the hospitality sector sustainable. Thus, those hotels that proactively adopt ESPs will be on the side of compliance and advantage in potential monetary incentives or certificated milestones for recognition on sustainability matters ([Prud'homme and Raymond, 2013](#)). The adoption of ESPs enhances an organizational culture that is environmentally oriented. When employees are involved with sustainable practices, they can more easily develop innovative thinking to create new, more environmentally friendly products or services for the organization. With such a cultural shift, increased green innovation might result from this since the staff will be able to share their ideas more effectively. Generally, the implementation of ESPs includes engaging employees, guests, and suppliers. These engagements can ensure knowledge sharing and collaboration in understanding innovative approaches toward sustainability challenges faced by [Amoako et al., \(2021\)](#). In this regard, feedback from customers on their preferred sustainable amenities acts as a motivating factor for

innovations in product offerings by hotels. Additionally, the research by [Singh et al. \(2014\)](#) highlights the direct cost benefits and efficiency improvements associated with sustainable practices amplified by innovative green technologies. Also, these results are consistent with those of [Cvelbar and Dwyer \(2013\)](#), who argue that the implementation of ESPs is a key driver in boosting hotel performance and generating stakeholder value. The result of the study by [Laggat et al. \(2023\)](#) also brought to light the substantial impact that ESPs exert on the multifaceted aspects of hotel performance. In addition, the findings prove that GI (Gpro, and Gprc) positively and directly enhances PERF.

In testing the mediating role of GI, the results indicated that GI (Gpro and Gprc) plays a full mediating role in the relationship between ESPs and PERF. Gpro concerns the development of new green products or services, while Gprc performs for organizational and technological process changes that imperatively influence environmental performance. Thus, both dimensions are interlinked with green innovation in enhancing the sustainability profile of hotels. Most hotels, by implementing ESPs, find the potential for innovations, either in product or operational processes. For example, an institution of a waste reduction program may trigger the creation of new recycling initiatives or environmentally friendly amenities. Hotels committed to sustainability are likely to invest in the development of innovative solutions that are in line with their environmental objectives. The result of such innovation could be the radical improvement of operational efficiency and environmental performance. Finally, the findings show that SE plays a significant moderating role in the relationship between ESPs and GI, as well as in the relationship between GI and PERF. SE is also one of the enabling mechanisms that not only enables the development of GI but also maximizes its positive effects on PERF by improving cooperation, knowledge sharing, and coordination of green goals inside and outside the organization ([Chen et al., 2024](#); [Ma & Chen, 2024](#)). SE also has a pivotal role as a mediator by facilitating the exchange of information, cooperation, and alignment of interests, which in turn strengthens the enactment of environmental sustainability practices to effective GI. In

the absence of SE, nonetheless, the value of ESPs in promoting GI could be clogged or undermined (Rahmayanti et al., 2024; He et al., 2025). In the context of these results, the influence of SE on the relationship between ESPs and GI is also significant (Hossain et al., 2022). This approach is supported by the findings of Goodman et al. (2017), which emphasize the role of collaborative innovation in achieving sustainability goals. Stakeholders not only support but also participate in the innovation process, making it crucial for hotels to foster environments that encourage such engagement. Tzschenke et al. (2008) asserted that stakeholder involvement is crucial in developing and deploying innovative green technologies and practices.

Moreover, the impact of SE is seen in its ability to facilitate the adoption and effectiveness of environmental sustainability practices, as demonstrated by the work of Irungu et al. (2022), who argue that employee motivation and participation are essential for advancing green practices in hotels. Engaging stakeholders effectively ensures that sustainability initiatives are more likely to be accepted and integrated into daily operations, leading to better environmental outcomes.

Furthermore, this study's outcomes align with the broader discourse on sustainability in the hospitality sector, where integrating environmental sustainability practices into business strategies is increasingly seen as a foundational aspect of CSR and not just an operational choice. This perspective is detailed in the work of Manaktola and Jauhari (2007), who discuss how CSR activities, including sustainability practices, significantly enhance customer perceptions and loyalty.

4.5. Theoretical Implications

In this study, we examine ESPs, GI, SE, and PERF in Egyptian 5-star hotels. Drawing on our findings, we now articulate integrated theoretical and practical implications. This study theoretically enriches the IDT and Resource-Based View (RBV) by demonstrating how SI is mediated, aligning with GSCM in higher-order for not only by firm-endowed resources in the form of brand reputation and image, but also by external stakeholders' perceptions in the form of satisfaction and trust. While RBV is inclined to act with firm-based capabilities as sources of competitiveness, our findings counter this inward focus by prioritizing the co-creation of brand value at customer interfaces, somewhat leaning towards Stakeholder Theory. Furthermore, our findings extend IDT by showing how green trust is a social process that enables diffused green practice regardless of the intrinsic properties of the innovation. This implies a theoretical connection between IDT's emphasis on innovation characteristics and stakeholder-driven diffusion mechanisms in the real world.

First, our partial mediation result ($VAF = 35\%$) reveals that GI plays a critical but not exclusive role in transmitting the effect of ESPs to PERF. This nuance challenges a strict application of Innovation Diffusion Theory (Rogers et al., 2014), which suggests innovation is the sole pathway for practice adoption; instead, our data indicate direct benefits of ESPs—beyond those mediated by GI—highlighting dual mechanisms of impact.

Second, while Stakeholder Theory (Freeman, 2010) predicts that engaging diverse stakeholders invariably enhances outcomes, our moderation analysis ($f^2 = 0.056$) shows a small-to-moderate effect of SE. This suggests that contextual factors (e.g., organizational size, cultural norms) likely condition the strength of stakeholder influence, pointing scholars toward more contingency-based models of stakeholder involvement.

Finally, the unexpectedly high R^2 for PERF (51%) underscores the combined power of ESPs and GI in emerging-market hotels but also signals potential omitted variables—such as regulatory pressure or green organizational culture—that future theory should integrate.

4.6. Practical Implications

Our results indicate that both direct ESPs initiatives (e.g., waste

management protocols) and innovative enhancements (e.g., eco-amenity design) contribute to green performance. Managers should therefore adopt dual strategies: implement baseline sustainability practices immediately, while phasing in green innovations to capture complementary benefits.

Given the moderate role of SE, hotel leaders ought to prioritize strategic stakeholder segments—particularly governmental bodies and local communities—where engagement yields the greatest marginal gain. For example, forging partnerships with municipal recycling programs may produce stronger performance boosts than broad, untargeted outreach.

Policymakers can support this dual path by offering tiered incentives: immediate grants for ESPs implementation and R&D tax credits for green innovation projects. Such alignment ensures hotels are rewarded for both foundational practices and continuous innovation.

Our cross-sectional survey ($n = 236$) provided robust evidence for hypothesized paths, but its design precludes causal inferences; thus, managers should pilot interventions and monitor performance longitudinally before scaling. The systematic random sampling enhanced representativeness within the sampled hotels, yet may under-represent frontline staff less engaged in sustainability decisions, suggesting that future mixed-methods research (e.g., interviews with maintenance staff) could uncover additional drivers of PERF.

4.7. Future research and limitations

The hospitality industry is increasingly focusing on sustainability and environmental preservation, leading to the need for hotels to implement environmental sustainability practices for long-term success (López-Gamero et al., 2024; Kuo et al., 2022). This study examines green performance (PERF) in the hotel context by integrating environmental sustainability practices (ESPs), green innovation (GI), and stakeholder engagement (SE).

Despite contributions, our research has several critical limitations. First, our sample size ($n = 236$), while adequate for PLS-SEM, may lack the statistical power to detect smaller mediation or moderation effects, increasing the likelihood of Type II errors. Second, the cross-sectional design limits our ability to infer causality; observed associations among ESPs, GI, and PERF may reflect reverse or reciprocal relationships. Future studies should adopt longitudinal designs to disentangle these dynamics. Third, our use of systematic random sampling from HR-provided employee lists, though structured, may introduce selection bias—employees who opted in could differ systematically (e.g., being more sustainability-minded) from non-respondents, thereby constraining the representativeness of our findings. Fourth, data were collected solely from Egyptian 5-star hotels, which may limit external validity given differing regulatory, cultural, and market conditions in other regions. Researchers should replicate this study in diverse geographic and hotel-category contexts (e.g., budget hotels, rural properties) to enhance generalizability.

Building on these limitations, we recommend that future research:

- Employ larger, more diverse samples to strengthen statistical power and reduce sampling bias.
- Use longitudinal or experimental designs to establish causal pathways among ESPs, GI, and PERF.
- Incorporate probabilistic sampling techniques to ensure representative samples of hotel employees across departments and regions.
- Investigate contextual moderators such as organizational size, ownership structure, and regulatory stringency, which may influence the efficacy of sustainability initiatives.
- Explore technological enablers (e.g., blockchain, AI, IoT) through mixed-methods approaches—combining surveys with case studies or interviews—to capture rich, context-specific insights.

- Compare across hotel segments (luxury vs. budget; urban vs. rural) and international markets to identify best practices and boundary conditions for green performance.

By critically reflecting on these limitations and charting clear directions for more rigorous and generalizable future work, we aim to guide subsequent studies toward a more nuanced understanding of sustainability in the hospitality industry.

CRedit authorship contribution statement

Ahmed K. Elnagar: Writing – original draft, Methodology, Data curation, Conceptualization. **Ahmad Mohammad Herzallah:** Writing – original draft, Methodology, Investigation, Conceptualization. **Mohammad Husni Hamed:** Writing – original draft, Investigation, Conceptualization. **Iriqat Raed Ali:** Writing – original draft, Investigation, Conceptualization. **Karam Zaki:** Validation, Software, Methodology, Formal analysis.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper

Data availability

Data will be made available on request.

References

- Alabo, R.L., Anyasor, M.O., 2020. Green marketing and sustainability of breweries in Nigeria. *Rachael Lolo Alabo and Okwuchukwu Marcus Anyasor, 2020 Green. Mark. Sustain. Brew. Niger. Eur. J. Bus. Innov. Res.* 8 (8), 19–48.
- Al-Hakimi, M.A., Al-Swidi, A.K., Gelaidan, H.M., Mohammed, A., 2022. The influence of green manufacturing practices on the corporate sustainable performance of SMEs under the effect of green organizational culture: A moderated mediation analysis. *Journal of Cleaner Production* 376, 134346.
- Almusaed, A., Yitmen, I., Almssad, A., 2023. Reviewing and integrating aec practices into industry 6.0: Strategies for smart and sustainable future-built environments. *Sustainability* 15 (18), 13464. <https://doi.org/10.3390/su151813464>.
- Amoako, G.K., Obuobisa-Darko, T., Marfo, S.O., 2021. Stakeholder role in tourism sustainability: the case of Kwame Nkrumah Mausoleum and centre for art and culture in Ghana. *Int. Hosp. Rev.* 36 (1), 25–44. <https://doi.org/10.1108/ihr-09-2020-0057>.
- Asadi, S., Pourhashemi, S.O., Nilashi, M., Abdullah, R., Samad, S., Yadegaridehkordi, E., Aljojo, N., Razali, N.S., 2020. Investigating influence of green innovation on sustainability performance: A case on Malaysian hotel industry. *J. Clean. Prod.* 258, 120860. <https://doi.org/10.1016/j.jclepro.2020.120860>.
- Ashley, C., De Brine, P., Lehr, A., Wilde, H., 2007. The role of the tourism sector in expanding economic opportunity. *John F. Kennedy Sch. Gov., Harv. Univ. Camb., MA*.
- Ayuso, S., 2007. Comparing voluntary policy instruments for sustainable tourism: The experience of the Spanish hotel sector. *J. Sustain. Tour.* 15 (2), 144–159. <https://doi.org/10.2167/jost617.0>.
- Bansal, P., Roth, K., 2000. Why companies go green: A model of ecological responsiveness. *Acad. Manag. J.* 43 (4), 717–736. <https://doi.org/10.5465/1556363>.
- Behera, A., 2018. Role of stakeholders in green practices of hotel industry: Evidence from greater hyderabad municipal corporation (GHMC) star hotels. *Asian J. Multidimens. Res. (AJMR)* 7 (11), 304–319.
- Bhattacharya, C.B., Sen, S., 2003. Consumer–company identification: A framework for understanding consumers' relationships with companies. *J. Mark.* 67 (2), 76–88. <https://doi.org/10.1509/jmk67.2.76.18609>.
- Bohdanowicz, P., 2005. European hoteliers' environmental attitudes. *Cornell Hotel Restaur. Adm. Q.* 46 (2), 188–204. <https://doi.org/10.1177/0018880404273891>.
- Bohdanowicz, P., 2006. Environmental awareness and initiatives in the Swedish and Polish hotel industries—survey results. *Int. J. Hosp. Manag.* 25 (4), 662–682. <https://doi.org/10.1016/j.ijhm.2005.06.006>.
- Bohdanowicz, P., Zientara, P., Novotna, E., 2011. International hotel chains and environmental protection: an analysis of Hilton's we care! programme (Europe, 2006–2008). *J. Sustain. Tour.* 19 (7), 797–816. <https://doi.org/10.1080/09669582.2010.549566>.
- Bolici, F., Acciarini, C., Marchegiani, L., Pirollo, L., 2020. Innovation diffusion in tourism: how information about blockchain is exchanged and characterized on twitter. *TQM J.* 36 (9), 255–279. <https://doi.org/10.1108/tqm-01-2020-0016>.
- Camilleri, M.A., 2022. Strategic attributions of corporate social responsibility and environmental management: The business case for doing well by doing good! *Sustain. Dev.* 30 (3), 409–422. <https://doi.org/10.1002/sd.2256>.
- Chan, E.S., 2008. Barriers to EMS in the hotel industry. *Int. J. Hosp. Manag.* 27 (2), 187–196. <https://doi.org/10.1016/j.ijhm.2007.07.011>.
- Chan, E.S., Hawkins, R., 2010. Attitude towards EMSs in an international hotel: An exploratory case study. *Int. J. Hosp. Manag.* 29 (4), 641–651. <https://doi.org/10.1016/j.ijhm.2009.12.002>.
- Chan, W.W., Ho, K., 2006. Hotels' environmental management systems (ISO 14001): creative financing strategy. *Int. J. Contemp. Hosp. Manag.* 18 (4), 302–316. <https://doi.org/10.1108/09596110610665311>.
- Chen, Y.-S., 2010. The drivers of green brand equity: Green brand image, green satisfaction, and green trust. *J. Bus. Ethics* 93, 307–319. <https://doi.org/10.1007/s10551-009-0223-9>.
- Chen, Y.-S., Lai, S.-B., Wen, C.-T., 2006. The Influence of Green Innovation Performance on Corporate Advantage in Taiwan. *J. Bus. Ethics* 67 (4), 331–339. <https://doi.org/10.1007/s10551-006-9025>.
- Chen, L., Qalati, S.A., Fan, M., 2024. Effects of sustainable innovation on stakeholder engagement and societal impacts: The mediating role of stakeholder engagement and the moderating role of anticipatory governance. *Sustain. Dev.* <https://doi.org/10.1002/sd.3247>.
- Cheng, S., Lam, T., Hsu, C.H., 2006. Negative word-of-mouth communication intention: An application of the theory of planned behavior. *J. Hosp. Tour. Res.* 30 (1), 95–116. <https://doi.org/10.1177/1096348005284269>.
- Chivandi, A., Sikhuli, M., Mlilo, T., 2023. Green Innovation Sustainability & Green Practice Behaviours in Tourism & Hospitality. *Athens J. Tour.* 10 (2).
- Cvelbar, L.K., Dwyer, L., 2013. An importance–performance analysis of sustainability factors for long-term strategy planning in Slovenian hotels. *J. Sustain. Tour.* 21 (3), 487–504. <https://doi.org/10.1080/09669582.2012.713965>.
- Dangelico, R.M., Pujari, D., 2010. Mainstreaming green product innovation: Why and how companies integrate environmental sustainability. *J. Bus. Ethics* 95, 471–486. <https://doi.org/10.1007/s10551-010-0434-0>.
- De Marchi, V., Pineda-Escobar, M.A., Howell, R., Verheij, M., Knorringa, P., 2022. Frugal innovation and sustainability outcomes: findings from a systematic literature review. *European Journal of Innovation Management* 25 (6), 984–1007.
- Elshaer, I.A., Azazz, A.M., Elsaadany, H.A., Elnagar, A.K., 2024. Social CRM Strategies. *A Key Driv. Strateg. Inf. Exch. Capab. Relatsh. Qual. Inf.* 15 (6), 329.
- Esthi, R.B., Setiawan, I., 2023. Green human resources management of the small and micro-enterprises in Indonesia. *Enrich: J. Manag.* 12 (6), 4877–4885. <https://doi.org/10.35335/enrichment.v12i6.1018>.
- Farmaki, A., 2019. Corporate social responsibility in hotels: a stakeholder approach. *Int. J. Contemp. Hosp. Manag.* 31 (6), 2297–2320. <https://doi.org/10.1108/IJCHM-03-2018-0199>.
- Farmaki, A., Altinay, L., Botterill, D., Hille, S., 2014. Politics and sustainable tourism: The case of Cyprus. *Tour. Manag.* 47, 178–190. <https://doi.org/10.1016/j.tourman.2014.09.019>.
- Freeman, R.E., 2010. *Strategic management: A stakeholder approach*. Cambridge university press.
- Goodman, J., Korsunova, A., Halme, M., 2017. Our collaborative future: Activities and roles of stakeholders in sustainability-oriented innovation. *Bus. Strategy Environ.* 26 (6), 731–753. <https://doi.org/10.1002/bse.1941>.
- Hair, J.F., Howard, M.C., Nitzl, C., 2020. Assessing measurement model quality in PLS-SEM using confirmatory composite analysis. *J. Bus. Res.* 109, 101–110. <https://doi.org/10.1016/j.jbusres.2019.11.069>.
- Han, H., Hsu, L.-T.J., Sheu, C., 2010. Application of the theory of planned behavior to green hotel choice: Testing the effect of environmental friendly activities. *Tour. Manag.* 31 (3), 325–334. <https://doi.org/10.1016/j.tourman.2009.03.013>.
- He, Q., 2025. The influence of organizational policies on firm environmental performance through sustainable technologies and innovation and stakeholder concerns. *Sci. Rep.* 15 (1). <https://doi.org/10.1038/s41598-025-94499-9>.
- Henseler, J., Ringle, C.M., Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *J. Acad. Mark. Sci.* 43 (1), 115–135. <https://doi.org/10.1007/s11747-014-0403-8>.
- Holcomb, J.L., Upchurch, R.S., Okumus, F., 2007. Corporate social responsibility: what are top hotel companies reporting? *Int. J. Contemp. Hosp. Manag.* 19 (6), 461–475. <https://doi.org/10.1108/09596110710775129>.
- Hornig, J.-S., Liu, C.-H., Chou, S.-F., Tsai, C.-Y., Chung, Y.-C., 2017. From innovation to sustainability: Sustainability innovations of eco-friendly hotels in Taiwan. *Int. J. Hosp. Manag.* 63, 44–52. <https://doi.org/10.1016/j.ijhm.2017.02.005>.
- Hossain, M.I., Ong, T., Heng, T., Mohd Said, R., Siow, M.L., 2022. Nexus of stakeholder integration, green investment, green technology adoption and environmental sustainability practices: Evidence from Bangladesh textile SMEs. *Pertanika J. Soc. Sci. Humanit* 30, 253–281. <https://doi.org/10.47836/pjssh.30.1.14>.
- Howard, M., Yan, X., Mustafee, N., Charnley, F., Böhm, S., Pascucci, S., 2022. Going beyond waste reduction: Exploring tools and methods for circular economy adoption in small-medium enterprises. *Resour., Conserv. Recycl.* 182, 106345. <https://doi.org/10.1016/j.resconrec.2022.106345>.
- Hsiao, T.-Y., Chuang, C.-M., 2016. Creating shared value through implementing green practices for star hotels. *Asia Pac. J. Tour. Res.* 21 (6), 678–696. <https://doi.org/10.1080/10941665.2015.1068194>.
- Huang, J.-W., Li, Y.-H., 2017. Green innovation and performance: The view of organizational capability and social reciprocity. *J. Bus. Ethics* 145, 309–324. <https://doi.org/10.1007/s10551-015-2903-y>.
- Irungu, R.W., Amwata, D.A., & Njoroge, J.M. (2022). Stakeholders' role in the adoption of green practices among star rated hotels along coastal Kenya: partnerships and

- collaborations. https://www.ijaemr.com/uploads/pdf/archivepdf/2022/IJAEMR_525.pdf.
- Jalilvand, M.R., Nasrolahi Vosta, L., Kazemi Mahyari, H., Khazaei Pool, J., 2017. Social responsibility influencing on customer trust in hotels: mediating effects of reputation and word-of-mouth. *Tour. Rev.* 72 (1), 1–14. <https://doi.org/10.1108/TR-09-2016-0037>.
- Javaid, M., Haleem, A., Singh, R.P., Suman, R., Gonzalez, E.S., 2022. Understanding the adoption of Industry 4.0 technologies in improving environmental sustainability. *Sustain. Oper. Comput.* 3, 203–217. <https://doi.org/10.1016/j.susoc.2022.01.008>.
- Jhariya, M.K., Banerjee, A., Meena, R.S., 2022. Importance of natural resources conservation: Moving toward the sustainable world. In *Natural resources conservation and advances for sustainability*. Elsevier, pp. 3–27. <https://doi.org/10.1016/B978-0-12-822976-7.00027-2>.
- Jones, P., Hillier, D., Comfort, D., 2014. Sustainability in the global hotel industry. *Int. J. Contemp. Hosp. Manag.* 26 (1), 5–17. <https://doi.org/10.1108/IJCHM-10-2012-0180>.
- Kasim, A., 2009. Managerial attitudes towards environmental management among small and medium hotels in Kuala Lumpur. *J. Sustain. Tour.* 17 (6), 709–725. <https://doi.org/10.1080/09669580902928468>.
- Khalifa, G.S., Elshaer, A.M., Hussain, K., Elnagar, A.K., 2025. What drives customers' participation behaviour? Unveiling the drivers of affective satisfaction and its impacts in the restaurant industry. *J. Hosp. Tour. Insights* 8 (2), 612–636.
- Khan, S.J., Dhir, A., Parida, V., Papa, A., 2021. Past, present, and future of green product innovation. *Bus. Strategy Environ.* 30 (8), 4081–4106. <https://doi.org/10.1002/bse.2858>.
- Khatter, A., White, L., Pyke, J., McGrath, M., 2021. Stakeholders' influence on environmental sustainability in the Australian hotel industry. *Sustainability* 13 (3), 1351. <https://doi.org/10.3390/su13031351>.
- Kucukusta, D., Mak, A., Chan, X., 2013. Corporate social responsibility practices in four and five-star hotels: Perspectives from Hong Kong visitors. *Int. J. Hosp. Manag.* 34, 19–30. <https://doi.org/10.1016/j.ijhm.2013.01.010>.
- Kularatne, T., Wilson, C., Månsson, J., Hoang, V., Lee, B., 2019. Do environmentally sustainable practices make hotels more efficient? A study of major hotels in Sri Lanka. *Tour. Manag.* 71, 213–225. <https://doi.org/10.1016/j.tourman.2018.09.009>.
- Kuo, F.-I., Fang, W.-T., LePage, B.A., 2022. Proactive environmental strategies in the hotel industry: Eco-innovation, green competitive advantage, and green core competence. *J. Sustain. Tour.* 30 (6), 1240–1261. <https://doi.org/10.1080/09669582.2021.1931254>.
- Langgat, J., Ramdani, B., Pavic, S., Tok, E., 2023. Environmentally sustainable practices and hotel performance: Evidence from Malaysia. *Sustainability* 15 (6), 5289. <https://doi.org/10.3390/su15065289>.
- Le, A.N.H., Khoi, N.H., Nguyen, D.P., 2021. Unraveling the dynamic and contingency mechanism between service experience and customer engagement with luxury hotel brands. *Int. J. Hosp. Manag.* 99, 103057. <https://doi.org/10.1016/j.ijhm.2021.103057>.
- Lehtinen, J., Aaltonen, K., 2020. Organizing external stakeholder engagement in inter-organizational projects: Opening the black box. *Int. J. Proj. Manag.* 38 (2), 85–98. <https://doi.org/10.1016/j.jiproman.2019.12.001>.
- Llanso, L., 2024. The Rise of Sustainability in Hospitality: the Pivotal Role of Energy Efficiency. *Spacewell Energy (Dexma)* (<https://www.dexma.com/blog-en/the-rise-of-sustainability-in-hospitality-the-pivotal-role-of-energy-efficiency/>).
- López-Gamero, M.D., Molina-Azorín, J.F., Tarí, J.J., Pertusa-Ortega, E.M., 2024. Interaction between sustainability practices and the mediating role of hotel performance. *J. Sustain. Tour.* 32 (5), 1027–1052. <https://doi.org/10.1080/09669582.2023.2198165>.
- Makhlouf, L., Tang, M., Omrane, A., Tahir, M.Z.B., 2020. How to improve environmental performance via green innovation-oriented practices and managerial environmental concerns? In *Sustainable Entrepreneurship, Renewable Energy-Based Projects, and Digitalization*. CRC Press, pp. 41–63.
- Manaktola, K., Jauhari, V., 2007. Exploring consumer attitude and behaviour towards green practices in the lodging industry in India. *Int. J. Contemp. Hosp. Manag.* 19 (5), 364–377. <https://doi.org/10.1108/09596110710757534>.
- Mensah, I., 2006. Environmental management practices among hotels in the greater Accra region. *Int. J. Hosp. Manag.* 25 (3), 414–431. <https://doi.org/10.1016/j.ijhm.2005.02.003>.
- Mensah, I., Blankson, E.J., 2013. Determinants of Hotels' Environmental Performance: Evidence from the Hotel Industry in Accra, Ghana. *J. Sustain. Tour.* 21 (8), 1212–1231. <https://doi.org/10.1080/09669582.2013.776058>.
- Mihalic, T., 2016. Sustainable-responsible tourism discourse—Towards 'responsustainable' tourism. *J. Clean. Prod.* 111, 461–470. <https://doi.org/10.1016/j.jclepro.2014.12.062>.
- Molina-Azorín, J.F., Claver-Cortés, E., Pereira-Moliner, J., Tarí, J.J., 2009. Environmental practices and firm performance: an empirical analysis in the Spanish hotel industry. *J. Clean. Prod.* 17 (5), 516–524. <https://doi.org/10.1016/j.jclepro.2008.09.001>.
- Mondoñedo, M.E.S.S., 2021. Stakeholder theory and the sustainable recovery of the tourism sector. *Atl. Antida. Rev. Canar. De Cienc. Soc.* (12), 31–56.
- Moshood, T.D., Nawani, G., Mahmud, F., Mohamad, F., Ahmad, M.H., AbdulGhani, A., Kumar, S., 2022. Green product innovation: A means towards achieving global sustainable product within biodegradable plastic industry. *J. Clean. Prod.* 363, 132506. <https://doi.org/10.1016/j.jclepro.2022.132506>.
- Ngo, T., Lohmann, G., Hales, R., 2018. Collaborative marketing for the sustainable development of community-based tourism enterprises: voices from the field. *J. Sustain. Tour.* 26 (8), 1325–1343. <https://doi.org/10.1080/09669582.2018.1443114>.
- Nhat, T.P., Tuckova, Z., Jabbour, C.J.C., 2020. Greening the hospitality industry: How do green human resource management practices influence organizational citizenship behaviors in hotels? A mixed-methods study. *Tourism Management* 72, 386–399.
- Nogueira, C.M., 2023. All Soc. Media are Stage.: Inter. Perspect. Lit. -to-Soc. -Media Adapt. (<http://hdl.handle.net/1843/61521>).
- O'Riordan, L., Fairbrass, J., 2014. Managing CSR stakeholder engagement: A new conceptual framework. *J. Bus. Ethics* 125, 121–145. <https://doi.org/10.1007/s10551-013-1913-x>.
- Olson, K., 2010. An examination of questionnaire evaluation by expert reviewers. *Field Methods* 22 (4), 295–318. <https://doi.org/10.1177/1525822X10379795>.
- Pasape, L., Anderson, W., & Lindi, G. (2012). Towards sustainable ecotourism through stakeholder collaborations in Tanzania. <https://doi.org/10.4172/2324-8807.1000109>.
- Porter, M.E., Linde, C. v d, 1995. Toward a new conception of the environment-competitiveness relationship. *J. Econ. Perspect.* 9 (4), 97–118. <https://doi.org/10.1257/jep.9.4.97>.
- Prud'homme, B., Raymond, L., 2013. Sustainable development practices in the hospitality industry: An empirical study of their impact on customer satisfaction and intentions. *Int. J. Hosp. Manag.* 34, 116–126. <https://doi.org/10.1016/j.ijhm.2013.03.003>.
- Puntillo, P., 2023. Circular economy business models: Towards achieving sustainable development goals in the waste management sector—Empirical evidence and theoretical implications. *Corp. Soc. Responsib. Environ. Manag.* 30 (2), 941–954. <https://doi.org/10.1002/csr.2398>Citations: 10.
- Rahmayanti, R., Sutisna, D., Salsabil, I., 2024. The role of stakeholder pressure in Enhancing green Innovation performance: The moderating role of green Culture. *Int. J. Sustain. Dev. Plan.* 19 (9), 3623–3632. <https://doi.org/10.18280/ijdsdp.190930>.
- Rassiah, P., Nasir, N.M., Subramaniam, R.K., Saleeth, H.M., 2024. Sustainable environmental management practices: evidence from hotels in Malaysia. *Glob. Sustain.* 7. <https://doi.org/10.1017/sus.2024.28>.
- Raub, S.P., Martin-Rios, C., 2019. Think sustainable, act local—a stakeholder-filter-model for translating SDGs into sustainability initiatives with local impact. *Int. J. Contemp. Hosp. Manag.* 31 (6), 2428–2447. <https://doi.org/10.1108/IJCHM-06-2018-0453>.
- Remy, D., Boo, H.C., Tee, S., 2023. From traditional to new hotel revenue management metrics: An exploratory study on the potential of NRevPAR and RevPAC. *Tour. Hosp. Manag.* 29 (2), 221–233. <https://doi.org/10.20867/thm.29.2.6>.
- Rogers, T., 2019. University of South Carolina. Sell. rooms Mak. Money Lodg. Ind.: Anal. Eff. RevPAR GOPPAR Together.
- Rogers, E.M., Singhal, A., Quinlan, M.M., 2014. Diffusion of innovations. In *An integrated approach to communication theory and research*. Routledge, pp. 432–448.
- Sajid, M., Ertz, M., 2024. Blueprints to Benefits: Towards an Index to Measure the Impact of Sustainable Product Development on the Firm's Bottom Line. *Sustainability* 16 (2), 537. <https://doi.org/10.3390/su16020537>.
- Sarkar, B., Ullah, M., Sarkar, M., 2022. Environmental and economic sustainability through innovative green products by remanufacturing. *J. Clean. Prod.* 332, 129813. <https://doi.org/10.1016/j.jclepro.2021.129813>.
- Sarkis, J., 2001. Manufacturing's role in corporate environmental sustainability—Concerns for the new millennium. *Int. J. Oper. Prod. Manag.* 21 (5/6), 666–686. <https://doi.org/10.1108/01443570110390390>.
- Serrano Baena, M.M., 2023. Archit. Sustain. Hotel.: Anal. Curr. Meas. Propos. Environ. Strateg. (<http://hdl.handle.net/10396/26041>).
- Shrivastava, P., 2018. Environmental technologies and competitive advantage. In *Business Ethics and Strategy, Volumes I and II*. Routledge, pp. 317–334. <https://doi.org/10.4324/9781315261102>.
- Sigala, M., 2018. New technologies in tourism: From multi-disciplinary to anti-disciplinary advances and trajectories. *Tour. Manag. Perspect.* 25, 151–155. <https://doi.org/10.1016/j.tmp.2017.12.003>.
- Singh, N., Cranage, D., Lee, S., 2014. Green strategies for hotels: Estimation of recycling benefits. *Int. J. Hosp. Manag.* 43, 13–22. <https://doi.org/10.1016/j.ijhm.2014.07.006>.
- Srivastava, P., Mishra, N., Singh, N., Ramkissoon, H., 2024. Beyond carbon footprints: the 'Greta Thunberg Effect' and tourist hotel preferences. *J. Travel Tour. Mark.* 41 (4), 578–595. <https://doi.org/10.1080/10548408.2023.2293017>.
- Stanislas, M., Kirytopoulos, K., Leopoulos, V., 2021. Integrating sustainability indicators into project management: The case of construction industry. *J. Clean. Prod.* 279, 123774. <https://doi.org/10.1016/j.jclepro.2020.123774>.
- Surya, I.B.K., Kot, S., Astawa, I.P., Rihayana, I.G., Arsha, I.M.R.M., 2024. Unlocking Sustain. Innov.: A Green. HR Approach Hosp. Ind. [https://doi.org/10.34021/ve.2024.07.02\(3](https://doi.org/10.34021/ve.2024.07.02(3). (www.virtual-economics.eu).
- Talley, J.L., Schneider, J., Lindquist, E., 2016. A simplified approach to stakeholder engagement in natural resource management: the Five-Feature Framework. *Ecol. Soc.* 21 (4). <https://doi.org/10.5751/ES-08830-210438>.
- Tseng, M.-L., Wang, R., Chiu, A.S., Geng, Y., Lin, Y.H., 2013. Improving performance of green innovation practices under uncertainty. *J. Clean. Prod.* 40, 71–82. <https://doi.org/10.1016/j.jclepro.2011.10.009>.
- Tzschenke, N.A., Kirk, D., Lynch, P.A., 2008. Going green: Decisional factors in small hospitality operations. *Int. J. Hosp. Manag.* 27 (1), 126–133. <https://doi.org/10.1016/j.ijhm.2007.07.010>.
- Upadhyay, A., Vadam, C., 2015. The University of Brighton. March 2 role Energy Consum. Hotel Oper. (<https://research.brighton.ac.uk/en/publications/the-role-of-energy-consumption-in-hotel-operations>) March 2.
- Vargas-Hernández, J.G., Pallagst, K., Zdunek-Wielgołaska, J., 2023. Urban green spaces as a component of an ecosystem. In *Sustainable Development and Environmental*

- Stewardship: Global Initiatives Towards Engaged Sustainability. Springer, pp. 165–198. https://doi.org/10.1007/978-3-031-28885-2_8.
- Wachira, I.R., Akinyi, A.D., Muiruri, N.J., 2022. Stakeholders' Role in the Adoption of Green Practices among Star Rated Hotels along Coastal Kenya: Partnerships and Collaborations. *Int. J. Adv. Eng. Manag. Res.* 7 (4). <https://doi.org/10.51505/ijaemr.2022.7406>.
- Weng, H.-H., Chen, J.-S., Chen, P.-C., 2015. Effects of green innovation on environmental and corporate performance: A stakeholder perspective. *Sustainability* 7 (5), 4997–5026. <https://doi.org/10.3390/su7054997>.
- Yuan, H., Su, M., Zywiłek, J., Rosak-Szyrocka, J., Javed, A., Yousaf, Z., 2023. Towards Innovation Performance of the Hospitality and Tourism Industry: Interplay among Business Ethics Diffusion, Service Innovation, and Knowledge-Sharing. *Sustainability* 15 (1), 886. <https://doi.org/10.3390/su15010886>.
- Zaki, K., Elnagar, A.K., 2024. Unpacking talent management: a moderated mediation analysis of team dynamics and competitive performance in luxury hotels. *Empl. Relat.: Int. J.*
- Zhang, J.J., Joglekar, N.R., Verma, R., 2012. Exploring resource efficiency benchmarks for environmental sustainability in hotels. *Cornell Hosp. Q.* 53 (3), 229–241. <https://doi.org/10.1177/1938965512441165>.
- Zhang, Q., Loh, L., Wu, W., 2020. How do environmental, social and governance initiatives affect innovative performance for corporate sustainability? *Sustainability* 12 (8), 3380. <https://doi.org/10.3390/su12083380>.