

Generative AI as an Enabler of Sustainable Innovation in Hospitality Organizations: A Case Study of a Resort Hotel in Türkiye

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Abstract: The growing pressure on tourism organizations to combine economic performance with environmental responsibility has increased interest in innovation-driven solutions. Among emerging technologies, Generative Artificial Intelligence (AI) is gaining attention for its potential to support sustainable innovation in service-oriented industries. This study explores the role of Generative AI in enabling sustainability-related innovation in hospitality organizations, drawing on a case study of a resort hotel in Türkiye. Using a mixed-method approach that combines secondary research with an employee survey, the study examines how sustainability initiatives and AI-supported practices are perceived and implemented at the organizational level. The findings suggest that Generative AI contributes to sustainable innovation by supporting more efficient resource use, improving operational coordination, and enhancing data-driven decision-making. Employees demonstrate strong awareness of sustainability goals and generally view AI as a supportive and complementary innovation rather than a disruptive technology, although differences in usage and skill levels remain. The study highlights that the innovation potential of Generative AI depends not only on technological availability but also on organizational readiness, employee learning, and managerial commitment. By linking Generative AI with sustainability and innovation outcomes, this research contributes to the growing literature on digital innovation in hospitality and offers practical insights for organizations seeking to integrate AI into long-term sustainability and innovation strategies.

Keywords: Generative Artificial Intelligence; Sustainable Innovation; Hospitality Innovation; Smart Tourism

1 Introduction

Tourism is one of the most important sectors contributing to economic growth worldwide and plays a vital role in national development and financial stability. It supports balance of payments, creates employment opportunities across multiple industries such as hospitality and transportation, and contributes to income

generation and overall production growth [1]. For many destinations, tourism remains a key driver of economic resilience and social development.

At the same time, the rapid growth of tourism presents serious sustainability challenges. Increasing visitor numbers place significant pressure on natural resources, contribute to pollution, and intensify overcrowding in popular destinations. These impacts highlight the need for new approaches that allow tourism organizations to remain competitive while reducing their environmental footprint [2].

In parallel with these challenges, organizations across industries are accelerating investments in Generative Artificial Intelligence, recognizing its potential as a driver of innovation rather than only a tool for automation [3]. Generative AI enables organizations to analyze large volumes of data, automate routine tasks, and support more informed decision making, making daily operations more efficient and adaptive [4]. Within the tourism sector, such capabilities open new opportunities for process innovation, service improvement, and sustainability-oriented solutions.

Recent research suggests that Artificial Intelligence can support sustainable tourism by improving resource efficiency, reducing waste, and promoting environmentally responsible practices [5]. However, while AI adoption in tourism is increasing, there is limited empirical research focusing specifically on Generative AI as an enabler of sustainable innovation at the organizational level. This study addresses this gap by examining how Generative AI supports sustainability-driven innovation through a case study of a resort hotel in Alanya, Türkiye.

2 Literature Review

Sustainable tourism is widely defined as an approach that aims to balance economic growth with social well being and environmental protection, ensuring that tourism activities today do not compromise opportunities for future generations [6]. As global tourism continues to expand, concerns related to environmental degradation, resource depletion, and overcrowding have become more pronounced. These challenges have increased pressure on tourism organizations to rethink traditional business models and adopt innovative solutions that support long term sustainability while maintaining competitiveness.

In response to these challenges, innovation has become a central topic in tourism and hospitality research. Technological innovation, in particular, is increasingly viewed as a key enabler of more sustainable operational practices. Among emerging technologies, Artificial Intelligence has received growing attention for its ability to support efficiency, adaptability, and value creation across tourism and hospitality organizations. AI driven systems are now commonly used in areas such as

marketing, pricing, demand forecasting, and customer relationship management. Applications including chatbots, recommendation engines, and automated decision support systems help reduce operational costs, improve service speed, and enhance guest satisfaction [7]. Over time, research focus has shifted from basic automation toward more advanced AI solutions that support learning, innovation, and strategic decision making.

Recent reviews indicate that AI research in hospitality has expanded significantly, with growing emphasis on personalization, intelligent service systems, operational optimization, and data-driven decision-making. AI has become one of the most influential technological developments shaping contemporary hospitality management [8].

Generative Artificial Intelligence represents a significant development within this broader AI landscape. Unlike earlier AI applications that primarily analyze or classify data, Generative AI is capable of producing new content such as text, reports, recommendations, simulations, and analytical insights. In hospitality organizations, these capabilities create new opportunities for innovation in service delivery, internal communication, training, and performance management. Generative AI can support guest engagement through personalized communication, assist employees with real time information access, and enable managers to make more informed decisions based on continuously generated insights.

Generative AI applications such as ChatGPT are increasingly being adopted to support customer interactions, content generation, service delivery, and managerial decision-making within tourism and hospitality organizations [9]. When integrated with complementary technologies such as the Internet of Things, cloud computing, and big data analytics, Generative AI enables more responsive, data driven, and sustainable operational models [10]. From an innovation perspective, this positions Generative AI not merely as a support tool but as a catalyst for process and organizational innovation.

Empirical studies and international case examples further illustrate how AI contributes to sustainability related innovation in tourism. Crowd monitoring systems implemented in cities such as Amsterdam help manage visitor flows and reduce pressure on urban infrastructure. Robot operated hotels in Japan demonstrate how automation and AI can address labor shortages while maintaining service consistency. Scandinavian hotels increasingly rely on AI enabled energy management systems to optimize consumption, while AI supported food waste monitoring solutions help hospitality organizations reduce environmental impacts and improve efficiency [11] [12]. These examples highlight the diverse ways AI supports innovation in sustainability practices, while also showing that adoption levels vary significantly across countries and organizational contexts. Similarly, AI contributes not only to operational efficiency but also to sustainability performance through enhanced resource management, personalized services, and improved marketing effectiveness [13].

Despite this growing body of applications, the literature consistently identifies several barriers that limit effective AI adoption in tourism and hospitality organizations. High investment costs, insufficient digital infrastructure, and limited availability of skilled employees are commonly cited challenges, particularly for small and medium sized enterprises [14]. In addition, concerns related to data privacy, ethical use of AI, transparency, and algorithmic bias create uncertainty for both managers and employees. These issues are especially critical in service industries, where trust, human interaction, and perceived fairness play a central role in customer experience and organizational reputation [15].

Beyond technical limitations, researchers increasingly emphasize the organizational and managerial dimensions of AI driven innovation. Successful implementation depends not only on technological capability but also on employee awareness, acceptance, and learning. In hospitality organizations, where operations are highly labor intensive and service oriented, staff engagement is particularly important. Studies highlight that structured training programs, clear internal communication, and gradual implementation strategies help reduce resistance to change and enable employees to view AI as a support mechanism rather than a threat. These organizational factors strongly influence whether AI becomes a driver of innovation or remains an underutilized resource. Similarly, the successful implementation of Generative AI depends on balancing technological capabilities with employee readiness, organizational support, and responsible management practices [16].

Policy and institutional support also play an important role in enabling responsible and innovation oriented AI adoption. National strategies provide guidance on ethical standards, governance principles, and long term development priorities. Türkiye's National Artificial Intelligence Strategy 2021–2025 emphasizes AI as a means of improving productivity, supporting digital transformation, and promoting sustainability across sectors [17]. Such frameworks encourage organizations to align AI adoption with broader innovation and sustainability goals while reducing uncertainty and implementation risks.

Overall, the literature suggests that Generative Artificial Intelligence holds significant potential to act as an enabler of sustainable innovation in hospitality organizations. However, its contribution depends on organizational readiness, employee capabilities, managerial commitment, and supportive policy environments. These insights provide the conceptual foundation for examining how Generative AI is applied in practice through the case study presented in this research.

Recent bibliometric evidence demonstrates a rapid increase in AI-related tourism and hospitality research, particularly studies examining Generative AI applications and their implications for service innovation. However, most studies focus on technology adoption, customer interactions, or marketing applications, leaving organizational-level sustainability and innovation outcomes comparatively underexplored [18].

Despite the growing body of research on AI in tourism and hospitality, limited empirical studies have specifically examined Generative AI as an enabler of sustainable innovation at the organizational level. This study seeks to address this gap through a case study of a resort hotel in Türkiye.

3 Material and Method

This study adopts a mixed research approach combining qualitative and quantitative methods to examine how Generative Artificial Intelligence supports sustainable innovation in hospitality organizations. A case study design was selected to allow an in depth exploration of AI adoption within its real organizational context, focusing on Quattro Beach Spa & Resort Hotel in Alanya, Türkiye.

Secondary data were collected through a review of academic literature, industry reports, government publications, and international case studies related to Artificial Intelligence, innovation, and sustainability in tourism. These sources provided a broader conceptual and strategic perspective, helping to identify key trends, best practices, and innovation related challenges across different hospitality contexts.

The literature reviewed in this study was identified through searches in Google Scholar, Scopus, and Web of Science using combinations of keywords such as "Generative AI", "Artificial Intelligence", "hospitality", "tourism", "innovation", and "sustainability". Priority was given to peer-reviewed journal articles, international reports, and policy documents that specifically addressed AI applications in tourism and hospitality contexts. This approach ensured that the selected sources were directly relevant to the study's focus on sustainable innovation and AI adoption in hospitality organizations.

Primary data were gathered through a printed survey administered to 44 hotel employees in April 2025. Employees from different departments participated voluntarily, providing perspectives on sustainability practices, AI usage, and innovation readiness.

The collected data were analyzed using descriptive statistical methods to identify patterns, relationships, and general trends. Tables and figures were used to present the findings in a clear and accessible manner. Ethical research principles were strictly followed, with participation being voluntary and all responses remaining anonymous. The survey results are summarized using descriptive tables to support the interpretation of innovation-related findings. This methodological approach supports a structured evaluation of how Generative AI contributes to sustainability driven innovation at the organizational level.

4 Results

This section presents the results of the employee survey conducted at Quattro Beach Spa & Resort Hotel Alanya. The findings focus on three main areas: employee awareness of sustainability practices, current use and understanding of Artificial Intelligence, and perceptions regarding the role of Generative AI in supporting operational improvement and innovation. Together, these results provide empirical insight into how sustainability and AI supported initiatives are experienced at the organizational level and how they contribute to innovation related outcomes. The findings presented in this section are based on responses from 44 employees working in different departments of the hotel.

4.1 Sustainability awareness and daily practices

The survey results reveal a high level of awareness regarding sustainability initiatives among hotel employees. Approximately 95% of respondents indicated that they are familiar with the hotel's sustainability practices and believe these initiatives have a positive impact on the environment. This suggests that sustainability is not limited to managerial strategy but is well understood and recognized across operational levels. Employees most frequently identified energy saving, water conservation, and waste reduction as the key sustainability practices implemented in the hotel.

Survey Dimension	Summary of Findings
Awareness of sustainability initiatives	Very high; approximately 95% of respondents reported familiarity.
Perceived environmental impact	Largely positive across departments.
Most recognized sustainability practices	Energy saving, water conservation, waste reduction.
Familiarity with Artificial Intelligence	Mostly medium level; few respondents reported no familiarity.
Perceived impact of AI on operational efficiency	Positive; over 60% agreed that AI improves efficiency and reduces workload.
Perceived impact of AI on employee roles	AI viewed as supportive and complementary rather than threatening.

Table 1.
Employee awareness of sustainability initiatives and perceptions of AI
Source: Author's own survey data

Importantly, respondents described these practices as part of their everyday routines rather than as isolated or symbolic activities. Examples included conscious energy usage, responsible waste handling, and efforts to minimize unnecessary resource consumption. This indicates that sustainability principles are embedded in daily operational behavior and reflect a shared commitment across departments. All respondents reported having received training related to sustainability, highlighting a strong institutional emphasis on environmental responsibility and supporting consistency in implementation.

Employee responses further suggest that sustainability considerations are integrated into routine decision making processes. Many participants associated sustainability with everyday operational choices, such as adjusting energy use, monitoring consumption, and following environmentally responsible procedures. This alignment between sustainability goals and day to day work practices demonstrates that environmental responsibility has become part of the hotel's organizational culture rather than being treated as a standalone initiative. From an innovation perspective, this cultural embedding creates a favorable foundation for introducing sustainability oriented technological and process innovations.

4.2 Familiarity with Artificial Intelligence and current usage

When examining familiarity with Artificial Intelligence, the findings indicate that most employees report a moderate level of awareness and understanding. While a smaller group described themselves as highly familiar with AI technologies, very few respondents indicated no familiarity at all. This distribution suggests that AI applications are present within the organization but are not uniformly visible or actively used across all departments.

Differences in familiarity appear closely linked to job roles and functional responsibilities. Employees working in guest facing, administrative, or coordination focused positions reported more frequent interaction with AI supported systems. In contrast, staff in operational roles with limited digital interaction reported lower exposure. This uneven distribution highlights that AI adoption within the hotel is still evolving and that innovation diffusion across departments remains partial rather than fully organizational.

Despite these differences, employee perceptions of AI were largely positive. More than 60% of respondents agreed that AI technologies contribute to improved operational efficiency and cost reduction. Employees frequently associated AI usage with faster processes, improved coordination, reduced manual workload, and easier access to information. These responses indicate that AI is primarily perceived as a supporting mechanism that enables smoother operations rather than as a disruptive force.

Notably, employees did not express strong concerns about AI replacing human labor. Instead, AI was viewed as complementing human work by reducing repetitive tasks, improving accuracy, and supporting staff performance. This perception is particularly important in the hospitality context, where service quality relies heavily on human interaction. From an innovation standpoint, this positive framing suggests a readiness to accept AI as part of broader process and service innovation efforts.

4.3 Variation in AI use and opportunities for innovation

Daily interaction with AI tools varied noticeably across departments. Some employees reported frequent use of AI supported systems in their daily work, while others engaged with such tools only occasionally. This variation indicates that AI implementation remains selective and that certain operational areas have yet to fully benefit from available technologies.

The uneven use of AI highlights clear opportunities for innovation through broader integration and more consistent application across departments. Employees acknowledged that existing AI tools could be used more effectively if accessibility and training were improved. These findings suggest that current limitations are not related to resistance but rather to uneven exposure and capability development. From an innovation management perspective, this points to the importance of internal alignment and inclusive implementation strategies.

4.4 Employee Perceptions of AI's Potential Impact on Guest Experience

In addition to operational efficiency, employees were asked about their perceptions regarding the potential of AI to improve guest experiences. Therefore, the findings

reflect employee opinions and expectations rather than direct measurements of guest satisfaction or actual guest experiences.

However, perceptions related to guest experience were more mixed compared to efficiency related outcomes. Some employees noted that while AI has clear potential, its impact is not yet fully visible across all services. This suggests that guest facing AI applications are still in an early stage of implementation or require further refinement to deliver consistently noticeable benefits. These findings underline that technological innovation alone is not sufficient; effective design and integration into service processes are equally important.

4.5 Training, learning, and organizational readiness

Training emerged as a recurring and critical theme in the findings. Although all respondents reported receiving sustainability related training, a smaller proportion indicated that they had received structured training specifically focused on AI technologies. This gap helps explain why some employees expressed uncertainty or limited confidence in using AI tools, despite recognizing their benefits.

Employees who reported higher familiarity with AI were generally more comfortable with innovation related changes and more likely to identify AI's contribution to both efficiency and sustainability goals. This suggests that training and learning play a central role in enabling AI driven innovation. The findings highlight the importance of targeted AI specific training programs to build skills, reduce uncertainty, and support more effective integration of Generative AI into daily operations.

Innovation Theme	Description
Sustainability embedded in daily operations	Environmental practices integrated into routine work processes.
AI as an efficiency enabler	AI supports faster processes, better coordination, and reduced manual tasks.
Uneven adoption of AI	Differences in AI usage across departments and job roles.
Training and learning needs	Limited AI-specific training identified as a key gap.
Employee innovation readiness	Generally positive attitudes toward AI-enabled changes.
Sustainability-driven innovation	AI contributes to measurable improvements in energy and resource management.

Table 2.
Innovation-related themes emerging from employee responses
Source: Author's own survey data

4.6 AI, sustainability, and innovation outcomes

From a sustainability perspective, the results demonstrate a clear link between AI usage and environmental objectives. Employees with higher AI familiarity were more likely to associate AI supported systems with improved energy management, waste reduction, and enhanced operational monitoring. This indicates that AI helps make environmental impacts more visible and measurable, supporting informed decision making at multiple operational levels.

As a result, AI is perceived not only as a tool for improving efficiency but also as an enabler of sustainability driven innovation. By supporting data based insights and process improvements, Generative AI reinforces sustainability goals while contributing to organizational learning and continuous improvement.

The tables and figures associated with this section further support these findings. Table 1 summarizes survey results related to sustainability awareness, perceived environmental impact, AI familiarity, and perceived efficiency outcomes. Table 2 presents key themes from employee feedback concerning AI adoption, training needs, and sustainability integration. Visual figures illustrate levels of sustainability awareness, perceived operational impact of AI, and employee comfort with AI technologies. Together, these visual elements strengthen the empirical evidence and complement the narrative analysis.

4.7 Summary of key findings

Overall, the results show that hotel employees are open to the adoption of Generative AI and generally recognize its value for both sustainability and operational improvement. At the same time, the findings underline the importance of structured training, effective internal communication, and inclusive implementation strategies in realizing the full innovation potential of AI. These results provide empirical support for the argument that Generative AI can function as an enabler of sustainable innovation in hospitality organizations when guided by appropriate managerial and organizational conditions.

Conclusion & Summary

This study examined how Generative Artificial Intelligence can support sustainable tourism development by acting as an enabler of organizational and process innovation, using Quattro Beach Spa & Resort Hotel Alanya as a case study. The findings indicate that Generative AI contributes to sustainability-oriented innovation by supporting energy saving, waste reduction, operational efficiency, and improved coordination across hotel functions. In addition, AI-supported tools show potential to enhance guest experience through faster service delivery and more effective communication.

The results also reveal that the successful use of Generative AI is not without challenges. High implementation costs, gaps in digital skills, and concerns related to data privacy and fairness continue to influence adoption levels. Although employees generally express positive attitudes toward AI and recognize its benefits, the findings highlight the need for more structured AI-focused training and clearer internal communication. Addressing these factors is essential to ensure that AI supports innovation rather than remaining underutilized.

From an innovation perspective, the study shows that Generative AI is most effective when integrated into existing sustainability strategies and supported by organizational learning and employee engagement. AI should be viewed as a complementary innovation that enhances human capabilities rather than replacing them. When combined with appropriate governance, training programs, and supportive policy frameworks, Generative AI can strengthen sustainability performance while fostering continuous innovation.

Overall, this research demonstrates that Generative AI offers practical and strategic value for hospitality organizations seeking to innovate sustainably. The findings provide insights for managers and policymakers in Türkiye and beyond on how AI can support long-term competitiveness through responsible and innovation-driven implementation.

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