

Review

The Role of Environmental Certification in the Hospitality Industry: Assessing Sustainability, Consumer Preferences, and the Economic Impact

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Abstract: Hotel certifications have become increasingly vital in promoting sustainability within the hospitality industry, providing frameworks that guide hotels toward reducing their environmental footprint, enhancing operational efficiency, and gaining a competitive edge in the marketplace. This review explores the development, types, and impact of hotel certifications, with a focus on prominent schemes, such as LEED, Green Key, and Earth-Check. Through an analysis of case studies from globally recognized hotels, we highlight how certifications contribute to significant reductions in energy and water use, improved waste management, and enhanced biodiversity protection, while also delivering economic benefits through cost savings and increased guest loyalty. Our paper also examines consumer perceptions of certifications and their willingness to pay (WTP) for certified hotels. The findings suggest that eco-conscious travelers, particularly younger generations, are willing to pay a premium for hotels that demonstrate a commitment to sustainability; however, consumer awareness of certification schemes remains limited. The barriers to adopting certifications, such as high initial costs, resource limitations, and management resistance, are also discussed, along with the challenges posed by greenwashing and the proliferation of certification schemes. Looking to the future, this review identifies key trends that will shape the evolution of hotel certifications, including increased transparency, the integration of smart technologies, the expanding role of social responsibility, and their alignment with global sustainability goals, such as the United Nations Sustainable Development Goals (SDGs). Hotel certifications are not only crucial for environmental sustainability, but also serve as a powerful tool for enhancing the economic viability of hotels in an increasingly competitive and sustainability-driven market.

Keywords: environmental certifications; sustainable tourism; hospitality industry; consumer behavior; willingness to pay (WTP); hotel sustainability



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1. Introduction

Sustainability has become a critical issue in the global tourism and hospitality industries, as environmental degradation, climate change, and the depletion of natural resources are increasingly influencing business practices and consumer behavior [1,2]. In

this context, environmental certifications for hotels have emerged as essential tools for promoting sustainable practices and aligning hospitality operations with broader environmental goals. Certifications, such as ISO 14001, Green Key, LEED, and EarthCheck, provide hotels with a structured framework to reduce their environmental footprint by focusing on energy efficiency, water conservation, waste management, and resource optimization. The integration of such certifications reflects the industry's commitment to minimizing its ecological impact, while simultaneously addressing growing consumer demand for sustainable tourism options [3].

The tourism sector is one of the largest and fastest-growing industries globally, contributing significantly to national economies. However, it is also a major source of environmental stress, with hotels alone responsible for substantial energy consumption, water use, and waste generation [4–6]. According to recent studies, tourism activities, particularly accommodation and transportation, contribute significantly to global carbon emissions, with an estimated 8% of total global emissions attributed to the sector [7]. As a result, hotels have faced mounting pressure to adopt environmentally friendly practices that can mitigate these impacts, while maintaining profitability and enhancing their market position. On the other hand, the COVID-19 pandemic has acted as a catalyst for businesses to adopt more resilient and sustainable practices, emphasizing the importance of digital technologies and regulatory shifts [8].

Environmental certifications serve as a bridge between operational sustainability and market competitiveness. These certifications not only demonstrate a hotel's compliance with recognized environmental standards, but also signal to environmentally conscious consumers that the establishment is committed to responsible resource management. In addition to environmental benefits, certifications can enhance a hotel's reputation, increase customer loyalty, and provide competitive advantages in an increasingly eco-conscious market [9]. Certified hotels often experience higher occupancy rates, reduced operating costs through more efficient resource use, and greater appeal to a growing segment of environmentally aware travelers [10].

In response to these trends, the hospitality industry has witnessed a significant increase in the adoption of environmental certifications over the past few decades [11]. However, challenges remain. The cost of obtaining and maintaining certifications, a lack of awareness in certain markets, and resistance from hotel management are some of the barriers that hinder broader implementation. Nevertheless, the potential economic and environmental benefits, coupled with increasing consumer demand for sustainable tourism, indicate that certification will continue to play a pivotal role in shaping the future of the hospitality industry.

While previous studies have explored individual certifications, their environmental impacts, or consumer perceptions separately, there remains a lack of comprehensive reviews that synthesize these perspectives. The existing literature often overlooks how certifications simultaneously contribute to environmental sustainability, economic benefits, and consumer preferences. This paper addresses this gap by offering a holistic review of the development, implementation, and impacts of hotel certifications, using both case studies and theoretical insights to guide future sustainability practices in the hospitality industry.

Building upon the existing literature, this study also identifies opportunities for future research to analyze the impact of hotel sustainability efforts on client perceptions and reviews. Inspired by works such as that of [12] on fair labor practices in hospitality, this approach can further validate how certifications influence customer satisfaction and loyalty.

Our review aims to explore the historical development, types, and impacts of hotel certifications, with a particular focus on their environmental and economic implications. Our paper also investigates consumer perceptions and willingness to pay (WTP) for certified

hotels, identifying key drivers of demand and the competitive advantages that certifications offer. In doing so, it seeks to provide a comprehensive overview of the current state of environmental certifications in the hospitality industry and offer insights into future trends and challenges.

The rest of our paper is structured as follows: After this brief introduction (part 1), the paper consists of part 2, which details the historical evolution of hotel certification; part 3, which presents the different types of hotel certification; part 4, which describes the impact of hotel certifications on sustainability; part 5, which contains details on consumer perceptions and willingness to pay for certified hotels; part 6, which contains information on the challenges and barriers to hotel certification adoption; part 7, which presents some case studies; part 8, which includes details on future trends; and part 9, which offers some concluding remarks.

2. Historical Evolution of Hotel Certification

This section provides a comprehensive overview of the historical development of hotel certification, highlighting key milestones, challenges, and future trends. The concept of certification in the hospitality industry, particularly within the hotel sector, has evolved over several decades in response to growing demands for transparency, quality assurance, and sustainability [13]. Certification serves as a mechanism through which independent bodies assess and verify that hotels meet established criteria, often related to service quality, environmental sustainability, safety, and customer satisfaction. This section traces the historical trajectory of hotel certification, highlighting key milestones in their development globally and within Greece.

2.1. Early Beginnings; The Drive for Standardization and Quality

The roots of hotel certification can be traced back to the early 20th century, a time when industries were increasingly seeking standardization, due to the rise of international trade and tourism. Initially, certifications were primarily concerned with product and service quality. One of the earliest initiatives was the formation of the British Standards Institute (BSI) in 1901, which laid the foundation for the development of quality standards across various sectors [14]. During this period, the primary focus of certifications was on ensuring consistent quality in service delivery and safety, particularly in sectors such as manufacturing and hospitality.

The formalization of quality standards for hotels became increasingly important as international tourism grew. The First World War and subsequent industrial revolutions increased the need for global trade regulations, fostering the establishment of organizations like the International Organization for Standardization (ISO) in 1947. Initially, these certifications were not environmentally focused, but were geared towards operational efficiency and safety [15]. Certifications for quality management system standard, later became a benchmark for businesses aiming to provide consistent service quality, including hotels.

2.2. The Emergence of Environmental Awareness from the 1970s to 1980s

The environmental movement that gained momentum in the 1970s [16] prompted a significant shift in the certification landscape. Concerns over environmental degradation, pollution, and resource depletion led to a growing awareness of sustainability in industries, including hospitality. During this period, governments and non-governmental organizations (NGOs) began to emphasize the importance of environmental responsibility in regard to business operations [17].

One of the pioneering movements in environmental certification was the introduction of the Blue Flag program in 1985, which certified beaches and marinas for their envi-

ronmental management and water quality [18]. This initiative laid the groundwork for subsequent environmental certification schemes in the tourism industry, including those focused specifically on hotels. The success of the Blue Flag program underlined the role of certification in promoting sustainable practices and incentivizing businesses to adopt environmental management protocols.

The 1980s also saw the development of the ISO 14001 standard for environmental management systems (EMS), a framework designed to help organizations reduce their environmental impact through systematic resource management. Although initially developed for the industrial sector, ISO 14001 became one of the first globally recognized environmental standards applicable to hotels. Its introduction marked a significant step toward formalizing environmental sustainability within the hospitality industry [19].

2.3. The Rise of Sustainable Tourism Certifications: 1990s

The 1990s was pivotal in the development of environmental certifications tailored specifically to the tourism and hospitality sectors. As tourism boomed globally, particularly in environmentally sensitive areas, the need for sustainable tourism practices became more pronounced. Governments, environmental organizations, and the tourism industry itself began to develop frameworks that would encourage hotels to adopt sustainable practices, while maintaining profitability [20].

One of the landmark certifications that emerged in this era was the Green Globe certification, launched in 1998. Green Globe was among the first certification schemes to be specifically tailored to the tourism industry, emphasizing sustainable resource use, energy efficiency, and community engagement. The program became widely recognized for its comprehensive approach to sustainability, offering hotels the opportunity to demonstrate their environmental commitment to a growing segment of eco-conscious travelers.

Another notable certification from this period is the EU Ecolabel, introduced in 1992 by the European Commission [21]. The EU Ecolabel provided stringent criteria for the sustainability of tourism accommodation, including hotels, and became a leading standard across Europe. Hotels certified under the EU Ecolabel are required to meet high standards in terms of energy efficiency, waste reduction, and water conservation, making it one of the most respected eco-certifications in the hospitality sector.

2.4. Expansion of Certifications in Greece; 1980s–2000s

Greece, a major tourism destination, followed international trends in regard to certification adoption, although its progression was closely tied to its integration with European Union policies. The 1980s marked the beginning of the country's alignment with European standards, as it joined the European Economic Community in 1981 [22]. This membership necessitated compliance with broader European directives on quality and environmental management, spurring the introduction of certifications in the Greek tourism sector.

During the 1990s, as environmental issues gained traction, Greek hotels increasingly adopted international certification schemes like ISO 14001 and EMAS (the Eco-Management and Audit Scheme), promoted by the European Union as part of its commitment to environmental sustainability. These certifications helped establish a foundation for sustainable tourism practices, particularly in regions with high tourist inflows, such as the islands of Crete, Rhodes, and the Cyclades [23].

The early 2000s saw a more widespread adoption of certifications in the tourism industry in Greece, with the Green Key and EU Ecolabel becoming prominent standards for hotels seeking to distinguish themselves in an increasingly competitive market. Hotels in Greece, particularly in coastal and island regions, began to embrace certifications as a means of reducing their environmental impact and enhancing their marketability [24]. The

success of certified hotels during this period demonstrated the tangible benefits of adopting sustainable practices, including reduced operational costs and increased customer loyalty.

2.5. Contemporary Developments in the 21st Century

The 21st century has witnessed the consolidation and expansion of environmental certifications across the global tourism industry. Certifications have become more diverse, reflecting the growing complexity of sustainability challenges faced by hotels. Programs like LEED (Leadership in Energy and Environmental Design) have expanded the scope of certifications to include not only environmental management, but also the sustainable design and construction of hotels. LEED-certified hotels are recognized for their green building practices, which include energy-efficient construction, waste reduction, and the use of sustainable materials.

In addition, certifications like EarthCheck and Travelife have emerged, further broadening the scope of sustainable certifications in the hotel industry. EarthCheck, founded in the early 2000s, is a science-based certification program that provides a comprehensive approach to sustainability, assessing hotels on criteria, such as greenhouse gas emissions, biodiversity, and community engagement [25]. Travelife, on the other hand, focuses on the social, environmental, and economic impact of hotels, offering a balanced perspective on sustainability.

Greece has continued to play a role in the expansion of these certifications, with hotels increasingly adopting multiple certifications to cater to a diverse range of environmentally conscious travelers. By the 2010s, Greek hotels, particularly in high-demand tourist areas, were not only seeking certifications for environmental reasons, but also to meet the expectations of international tourists seeking sustainable travel options. The growing demand for certified hotels has led to increased competition among establishments to achieve higher levels of sustainability [26].

2.6. Future Directions and Challenges

As hotel certifications continue to evolve, several trends and challenges have emerged. First, the demand for transparency in regard to certification processes has increased, with consumers and regulatory bodies alike calling for more stringent criteria and third-party verification. Certifications that rely on self-assessment are becoming less trusted, pushing the industry towards more rigorous, externally audited certifications [27].

Moreover, while environmental certifications have become more widespread, issues such as greenwashing, where hotels claim to be environmentally friendly without meeting substantial criteria, pose a challenge to the credibility of certification schemes. To combat this, certification bodies are refining their standards and expanding their focus to include broader aspects of sustainability, such as social responsibility and cultural heritage preservation [28].

The development of hotel certifications has been driven by a combination of environmental concerns, market demand, and regulatory pressure. From early quality assurance programs to comprehensive sustainability certifications, the evolution of these certifications reflects the shifting priorities of both consumers and businesses. As the hospitality industry moves forward, certifications will continue to play a key role in ensuring that hotels meet the sustainability expectations of their guests, while contributing to the global effort to reduce the environmental impact of tourism.

3. Research Methodology

3.1. Study Design

This study employs a qualitative approach to synthesize the existing knowledge and evaluate the impact of hotel certifications on environmental and economic sustainability. By combining a literature review, case studies, and published consumer insights, this research provides a comprehensive understanding of the role certifications play in the hospitality sector.

3.2. Data Sources

3.2.1. Literature Review

A review of academic articles, industry reports, and case studies was conducted using search terms such as “hotel certifications”, “sustainability”, “willingness to pay (WTP)”, and “eco-tourism”. The selected studies span publications from 2000 to 2024, to capture both historical developments and current trends. Specific hotel certifications like LEED, Green Key, and EarthCheck were analyzed to highlight their implementation and outcomes. Case studies, including the Radisson Blu Athens, were used to explore sustainability practices and consumer reception. Existing journal articles reporting on consumers’ WTP for certified hotels provided insights into consumer preferences, satisfaction, and behaviors.

3.2.2. Research Scope and Sample

This study synthesizes secondary data to examine consumer perceptions and WTP for certified hotels. The research focuses on two key areas: (i) certified hotels, where the data come from case studies, industry reports, and secondary journals on hotels certified under programs such as LEED, Green Key, and EarthCheck; and (ii) consumer behavior, whereby the consumer perception data were sourced from existing academic research and reports discussing their willingness to pay for eco-certified hotels. The analysis considers global data, with particular emphasis on European case studies, such as the implementation of certifications at Radisson Blu Athens. The timeframe of the studies spans 2000–2024, ensuring a thorough review of the trends in terms of certifications and consumer behavior.

3.2.3. Data Collection and Analysis

Consumer WTP data were sourced from journal articles that focus on the economic and behavioral impacts of hotel certifications. Reports from certification bodies (e.g., Green Key and EarthCheck) provided quantitative insights into environmental and economic outcomes. Regarding the analysis, qualitative thematic analysis was conducted to identify recurring patterns in consumer behavior, sustainability outcomes, and consumer WTP for certified accommodation. Insights from the case studies and reviewed papers were consolidated to form a comprehensive understanding of how hotel certifications influence consumer perceptions and economic sustainability.

4. Types of Hotel Certification

Hotel certifications serve as formal acknowledgments of compliance with specific standards across various domains, such as environmental sustainability, quality management, health and safety, and ethical business practices. These certifications are designed to help hotels enhance their operational efficiency, reduce their environmental impact, improve customer satisfaction, and demonstrate their commitment to corporate social responsibility. This section explores the major types of hotel certification, focusing on environmental, quality, health and safety, and social responsibility standards, along with a comparative analysis of their benefits.

4.1. Environmental Certifications

Environmental certifications are some of the most widely recognized and sought-after certifications in the hospitality industry. As consumer awareness of sustainability grows, hotels are increasingly adopting these certifications to demonstrate their commitment to environmental protection and resource management. Some of the most prominent environmental certifications in the hotel industry include:

4.1.1. ISO 14001; Environmental Management System

ISO 14001 is one of the most widely implemented environmental standards, globally. It provides a framework for establishing, implementing, maintaining, and improving an environmental management system (EMS). For hotels, ISO 14001 involves comprehensive strategies to minimize their environmental footprint through efficient energy use, waste management, and resource conservation [24]. The certification helps hotels comply with the regulatory requirements and positions them as environmentally responsible establishments. Additionally, ISO 14001-certified hotels often experience cost savings through reduced resource consumption and enhanced operational efficiency.

4.1.2. Green Key Certification

The Green Key certification is a leading international eco-label for tourism facilities, particularly hotels. This certification focuses on reducing environmental impacts through energy efficiency, waste reduction, water conservation, and eco-friendly guest services. To receive Green Key certification, hotels must meet specific criteria across several environmental areas, including energy management, water use, and waste reduction. Green Key-certified hotels benefit from enhanced marketability to eco-conscious travelers and reduced operational costs due to sustainable practices [10]. As a certification that emphasizes continuous improvement, Green Key requires periodic reassessments, ensuring that hotels remain committed to sustainability over time.

4.1.3. LEED (Leadership in Energy and Environmental Design)

LEED is a globally recognized green building certification that evaluates the environmental performance of buildings, including hotels. Managed by the U.S. Green Building Council (USGBC), LEED focuses on sustainable design, construction, and operations. Hotels seeking LEED certification are assessed on various sustainability criteria, including energy efficiency, water conservation, indoor air quality, and the use of sustainable materials [29]. The LEED certification is highly regarded in the hospitality industry, especially among luxury and high-end hotels that aim to differentiate themselves through sustainable building practices. The certification not only improves the environmental performance of hotels, but also enhances their reputation as eco-friendly destinations.

4.1.4. EarthCheck

EarthCheck is a science-based certification program designed specifically for the travel and tourism industry. It evaluates hotels on a range of sustainability criteria, including greenhouse gas emissions, energy and water consumption, waste management, and biodiversity conservation. EarthCheck-certified hotels are required to continuously improve their environmental performance, ensuring that they meet or exceed industry best practices in regard to sustainability [25]. The certification provides hotels with tools to track and manage their sustainability efforts, offering a data-driven approach to environmental management. The historical evolution of hotel certification is summarized in Table 1, highlighting key milestones and their significance.

Table 1. Historical evolution of hotel certification.

Period	Certification Program	Key Milestone
1985	Blue Flag	Certification for beaches and marinas
1993	EU Eco-Management and Audit scheme (EMAS)	Framework for organizational environmental performance
1996	ISO 14001	Environmental management system standard
2000s	Green Key, EarthCheck	Certification focusing on eco-tourism
Present day	LEED, GSTC Standards	Focus on environmental and social sustainability

Source: The authors.

4.1.5. EU Ecolabel

The EU Ecolabel is a certification scheme established by the European Commission to promote environmentally friendly products and services. Hotels certified with the EU Ecolabel must meet stringent criteria related to energy consumption, water use, waste generation, and the use of eco-friendly materials [30]. The certification is widely adopted across Europe, particularly in countries with strong environmental policies. EU Ecolabel-certified hotels often attract environmentally conscious guests, who prioritize sustainability in terms of their travel choices.

4.2. Quality Management Certifications

Quality management certifications focus on improving hotel operations, ensuring that they meet or exceed guest expectations in terms of service delivery, operational efficiency, and customer satisfaction. These certifications are valuable tools for hotels that are aiming to standardize their operations and enhance their competitiveness.

4.2.1. ISO 9001; Quality Management System

ISO 9001 is the most widely recognized quality management standard in the world. It provides a framework for establishing consistent and efficient processes that enhance customer satisfaction, operational efficiency, and service quality. For hotels, ISO 9001 certification involves the implementation of a systematic approach to managing guest services, staff training, and process improvements [31]. ISO 9001-certified hotels benefit from a reputation for delivering high-quality services, which can lead to increased guest loyalty and higher occupancy rates.

4.2.2. The Five-Star Rating System

In addition to formal certifications like ISO 9001, hotels are often classified using star rating systems, which serve as a proxy for quality assurance. The star rating system is widely used across the globe to evaluate hotels based on their amenities, service quality, and overall guest experience. In Greece, for example, the five-star rating system is a mandatory classification regulated by law (FEK216) and helps guests choose accommodation that matches their expectations in terms of luxury and service [32]. Although the star system is not a formal certification, it plays a crucial role in informing consumer choices and promoting quality standards in the hospitality industry.

4.3. Health and Safety Certifications

Health and safety are fundamental concerns for hotels, particularly in light of recent global health challenges like the COVID-19 pandemic. Certifications in this area focus on ensuring that hotels provide a safe environment for both guests and staff, adhering to stringent health and safety protocols.

4.3.1. Occupational Health and Safety

In the context of hotels, Occupational Health and Safety certification ensures that hotel operations comply with health and safety regulations, minimizing the risk of accidents and ensuring a safe working environment for staff and guests [33]. Hotels with ISO 45001 certification demonstrate their commitment to protecting both their employees and guests from health hazards, which is particularly important in the post-pandemic world.

4.3.2. HACCP and Food Safety Standards

HACCP (Hazard Analysis and Critical Control Points) and ISO 22000 are certifications focused on food safety, a critical aspect of hotel operations. These certifications ensure that hotels adhere to stringent food safety protocols, minimizing the risk of contamination and foodborne illnesses. Hotels with food and beverage services have a particular focus on obtaining these certifications to ensure compliance with health regulations and to maintain guest trust [34].

4.4. Social Responsibility and Ethical Certifications

As guests become more aware of social issues, such as fair labor practices and community engagement, certifications related to corporate social responsibility (CSR) have gained traction in the hotel industry. These certifications emphasize ethical business practices and the role of hotels in supporting local communities and economies.

4.4.1. Travelife Certification

Travelife is a leading international sustainability certification for the hotel and accommodation sector, focusing on both environmental and social sustainability. It assesses hotels on a wide range of criteria, including fair labor practices, community engagement, and support for local economies [35]. Travelife-certified hotels are recognized for their ethical business practices and commitment to sustainable development. This certification is particularly attractive to travelers seeking accommodation that aligns with their ethical values.

4.4.2. Fair Trade Tourism

Fair Trade Tourism is a certification scheme that promotes ethical and sustainable tourism practices, ensuring that hotels and other tourism providers adhere to fair labor standards, environmental sustainability, and community support initiatives. Fair Trade-certified hotels must demonstrate that they provide fair wages, safe working conditions, and community benefits, making this certification particularly valuable for socially conscious travelers [36].

4.5. Comparative Analysis of Certifications

While all certifications offer benefits to hotels, the focus and scope of each certification vary widely. Environmental certifications, such as ISO 14001, Green Key, and Earth-Check, are primarily concerned with reducing a hotel's environmental impact through resource management and sustainability initiatives. Quality management certifications, like ISO 9001, focus more on operational efficiency and customer satisfaction, helping hotels streamline their processes to meet guest expectations.

Health and safety certifications, particularly in the wake of the COVID-19 pandemic, have gained new significance, with ISO 45001 and HACCP/ISO 22000 ensuring that hotels provide a safe and hygienic environment for both their staff and guests. Finally, certifications like Travelife and Fair Trade Tourism address the growing demand for ethical and socially responsible travel options, positioning hotels as leaders in sustainable tourism.

Hotels that obtain multiple certifications can benefit from a comprehensive approach to sustainability, quality, safety, and social responsibility. These certifications not only enhance the hotel's reputation, but also improve its operational efficiency, guest loyalty, and competitiveness in an increasingly crowded market.

5. Impact of Hotel Certifications on Environmental and Economic Sustainability

Hotel certifications have become crucial tools for improving both the environmental and economic sustainability of the hospitality industry. These certifications serve as frameworks that help hotels implement and maintain sustainable practices, while also offering a competitive advantage in an increasingly eco-conscious market. This section explores the direct and indirect impacts of hotel certifications on environmental performance, resource efficiency, operational costs, marketability, and the long-term financial viability of certified hotels.

5.1. Environmental Impact of Hotel Certifications

Environmental sustainability has become a key concern for the hospitality industry due to the significant ecological footprint of hotels. From energy consumption and water usage to waste generation and carbon emissions, hotels contribute substantially to environmental degradation. Certifications provide a pathway for reducing these impacts through structured environmental management systems and standards.

5.1.1. Energy Efficiency and Carbon Emission Reduction

Hotels are major consumers of energy, relying heavily on heating, cooling, lighting, and other energy-intensive operations. Certifications, such as ISO 14001, LEED, and Green Key, emphasize energy conservation strategies, helping hotels to reduce their energy consumption through efficient technologies and practices. For instance, ISO 14001-certified hotels typically implement energy management systems that monitor and optimize energy use, reducing the need for excessive energy consumption. LEED-certified hotels often incorporate green building designs, such as energy-efficient windows, insulation, and renewable energy sources, like solar panels [37].

In terms of carbon emissions, certifications like EarthCheck focus on greenhouse gas management, requiring hotels to track and reduce their carbon footprint. According to research, tourism accounts for approximately 8% of global carbon emissions, with a significant portion stemming from hotels and accommodation services [38]. Through the implementation of renewable energy sources and energy-efficient technologies, certified hotels can significantly reduce their carbon emissions, contributing to global efforts to combat climate change.

5.1.2. Water Conservation and Waste Management

Water conservation is another critical aspect of environmental sustainability in hotels. Many certifications, such as Green Key, require hotels to implement water-saving technologies, such as low-flow faucets, dual-flush toilets, and water-efficient laundry systems. In regions with water scarcity, these practices are particularly vital for maintaining operational sustainability and reducing the environmental impact of tourism. Certified hotels often adopt comprehensive water management plans that include water recycling, rainwater harvesting, and regular monitoring of water usage [4,5,39].

In terms of waste management, certifications like ISO 14001 and the EU Ecolabel set stringent requirements for waste reduction, recycling, and the proper disposal of hazardous materials. Hotels are encouraged to minimize waste generation by reducing single-use plastics, promoting recycling programs, and composting organic waste. Green Key-certified hotels, for example, have waste reduction strategies that focus on sorting

and recycling materials, reducing food waste through donation programs, and promoting reusable items [40].

5.1.3. Biodiversity and Ecosystem Protection

Hotels located in environmentally sensitive areas, such as coastal regions or areas with high biodiversity, are under increasing pressure to adopt practices that protect local ecosystems. Certifications like EarthCheck include criteria related to biodiversity conservation, requiring hotels to minimize their impact on local ecosystems by managing their water and waste systems carefully and reducing pollution [41]. These certifications often encourage hotels to work with local communities to protect wildlife and preserve natural habitats, contributing to the conservation of biodiversity and the promotion of eco-tourism.

5.2. Economic Impact of Hotel Certifications

While the environmental benefits of certifications are clear, the economic impact of adopting sustainable practices through certifications is equally significant. Certified hotels not only contribute to environmental sustainability, but also gain economic advantages by reducing operational costs, increasing guest loyalty, and enhancing their market positioning. Below, we explore how certifications impact the financial health and competitiveness of hotels.

5.2.1. Cost Savings Through Resource Efficiency

One of the most tangible economic benefits of hotel certifications is the cost savings achieved through resource efficiency. By adopting energy-efficient technologies and water conservation practices, certified hotels can significantly reduce their utility bills. For example, Green Key-certified hotels often report lower water and energy costs due to the implementation of sustainable practices like energy-saving appliances, LED lighting, and greywater systems [42].

A study by [3] highlighted that hotels implementing ISO 14001 experienced significant reductions in energy costs, up to 20%, by adopting energy-efficient systems and optimizing resource usage. These savings can be reinvested in further sustainability initiatives or used to improve overall profitability [6]. Similarly, LEED-certified hotels can reduce their operational costs by improving energy and water efficiency through sustainable building design and maintenance.

5.2.2. Increased Marketability and Competitive Advantage

Environmental certifications enhance the marketability of hotels, particularly among eco-conscious travelers. Studies have shown that consumers are willing to pay more for sustainable hotels, especially those that are certified by recognized eco-labels. For instance, certified hotels attract a segment of travelers who prioritize sustainability in regard to their travel decisions and are willing to pay a premium for accommodation that meets environmental standards [42].

Certifications, such as Green Key, EarthCheck, and the EU Ecolabel, provide a competitive edge in the crowded hospitality market, allowing certified hotels to differentiate themselves from their competitors. Hotels with these certifications often use them as marketing tools, highlighting their sustainability efforts in promotional materials, on booking platforms, and in customer communications. This not only enhances the hotel's reputation, but also drives higher occupancy rates and customer loyalty.

5.2.3. Increased Occupancy and Guest Loyalty

Certified hotels often experience higher occupancy rates due to their appeal to environmentally conscious consumers. Research suggests that travelers, particularly in Europe

and North America, are increasingly seeking eco-friendly hotels and they are more likely to choose hotels that demonstrate a commitment to sustainability [43]. Certifications, such as Green Key and Travelife, serve as visible indicators of a hotel's environmental and social responsibility, making them attractive to guests who prioritize sustainability.

In addition to attracting new guests, certifications can foster guest loyalty by providing a sense of trust and assurance in the hotel's sustainability practices. Guests who value environmental responsibility are more likely to return to hotels that align with their values, leading to repeat business and positive word-of-mouth recommendations [44]. This loyalty is further reinforced by the transparency and credibility that certifications offer, as they provide guests with a clear understanding of the sustainability commitments of the hotel.

5.2.4. Long-Term Financial Viability

While the upfront costs of obtaining certifications can be significant, the long-term financial benefits often outweigh the initial investment. Hotels that implement sustainability practices through certifications can achieve long-term financial viability by reducing their reliance on finite resources, lowering their operational costs, and appealing to the growing market of eco-conscious consumers [45]. Additionally, many governments and organizations offer financial incentives, such as grants and tax breaks, for hotels that obtain environmental certifications, further enhancing their economic sustainability.

Hotels certified under the EU Ecolabel have experienced a 10% increase in their annual revenue due to improved operational efficiency and increased guest demand for certified accommodation [46]. This demonstrates that certifications not only benefit the environment, but also contribute to the financial sustainability of the hotel industry.

5.2.5. Challenges and Barriers to Economic and Environmental Sustainability

Despite the numerous benefits of certifications, hotels face several challenges in achieving and maintaining certification. One of the primary barriers is the cost of certification itself. For many small and medium-sized hotels, the financial burden of obtaining and maintaining certifications can be prohibitive [47]. Moreover, the cost of implementing the necessary improvements, such as upgrading to energy-efficient systems or installing water-saving technologies, can be significant.

Additionally, there are challenges related to staff training and management buy-in. For certification to be effective, hotel staff must be trained in sustainable practices and management must be committed to long-term sustainability goals. In some cases, hotel operators may resist change due to perceived risks or costs, limiting the potential impact of certifications in regard to both environmental and economic sustainability.

Finally, there is the issue of consumer awareness. While eco-conscious travelers are increasingly seeking certified accommodation, not all guests are aware of the significance of certifications or the environmental efforts behind them. As a result, hotels may struggle to fully capitalize on the competitive advantage that certifications offer if they are not effectively communicating their sustainability efforts to potential guests [48].

The different types of hotel certification, along with their focus areas, are presented in Table 2, to enable a clearer comparison.

The pandemic also spurred regulatory changes and promoted the adoption of advanced technologies in regard to sustainability practices, as highlighted by [8]. Businesses increasingly focus on resilience and sustainability to adapt to post-pandemic challenges.

Table 2. Types of hotel certification.

Certification	Focus Area	Examples of Adoption
LEED	Energy efficiency and design	Luxury and business hotels
ISO 14001	Environmental management	International hotel chains
Green Key	Eco-tourism and resource efficiency	Boutique and coastal hotels
EarthCheck	Holistic sustainability (EMS, waste, etc.)	Resorts and eco-hotels

Source: The authors.

6. Consumer Perceptions and Willingness to Pay (WTP) for Certified Hotels

In recent years, consumer awareness of sustainability issues has grown significantly, influencing various industries, including hospitality. Environmental certifications, such as ISO 14001, Green Key, and LEED, are increasingly viewed by consumers as credible indicators of a hotel's commitment to sustainable practices [49]. However, consumer perceptions of these certifications and their willingness to pay (WTP) for certified hotels vary depending on factors such as geographic location, cultural values, personal experiences, and socio-economic status [50]. This section explores consumer perceptions of hotel certifications, the factors influencing their WTP, and the practical implications for hotels in the sustainable tourism market.

6.1. Consumer Perceptions of Hotel Certifications

Consumers are increasingly aware of the environmental and social impacts of tourism. Many travelers now consider the sustainability of their travel choices, including the environmental credentials of the hotels they book. Hotel certifications serve as visible indicators of a property's commitment to sustainable practices, helping consumers make more informed decisions about where to stay. Several factors shape how consumers perceive hotel certifications, including awareness, trust, and perceived value. The adoption of emerging technologies, such as virtual reality, is increasingly shaping the ability of the tourism sector to provide sustainable and immersive experiences. As [51] highlight, the pandemic has accelerated the intention to adopt VR, demonstrating its potential to complement sustainable tourism strategies.

6.1.1. Awareness and Understanding of Certifications

Despite the growing prevalence of hotel certifications, consumer awareness and understanding of these certifications vary widely. Research suggests that while a significant portion of travelers has heard of environmental certifications, few are familiar with the specific criteria or standards behind them [52]. For instance, a study by [9] found that although many consumers were aware of labels like Green Key and LEED, they often did not fully understand what these certifications entail. This gap between awareness and understanding can limit the effectiveness of certifications as a marketing tool for hotels, as consumers may not recognize the full value of staying at certified properties.

However, as sustainability becomes a more prominent consideration in regard to travel choices, the awareness of hotel certifications is expected to increase. In particular, younger generations, including Millennials and Generation Z, tend to be more knowledgeable about sustainability issues and are more likely to prioritize eco-friendly hotels [53]. This growing awareness has led to increased demand for transparency in regard to certification processes, with consumers seeking more information on what specific certifications mean and how they impact hotel operations.

6.1.2. Trust and Credibility of Certifications

Trust is a crucial factor in shaping consumer perceptions of hotel certifications. Travelers are more likely to choose certified hotels if they trust the certification process and believe that the hotel genuinely adheres to sustainable practices. However, concerns about greenwashing, where hotels claim to be environmentally friendly without meeting rigorous sustainability standards, can undermine consumer trust [54]. Certifications that are backed by third-party audits, such as ISO 14001 and EarthCheck, tend to be trusted more by consumers compared to self-declared sustainability claims made by hotels.

The credibility of certifications is further enhanced by the transparency of the certification process. Consumers are increasingly demanding more detailed information about the criteria hotels must meet to obtain certification, as well as how these criteria translate into tangible environmental benefits. Certifications that provide clear, measurable outcomes, such as reductions in energy consumption, water use, or waste generation, are likely to be viewed more favorably by consumers [55].

6.1.3. Perceived Value of Staying at Certified Hotels

The perceived value of staying at certified hotels is another important factor in consumer decision making. While some travelers are motivated primarily by environmental concerns, others may perceive certified hotels as offering additional benefits, such as better service quality or higher safety standards. For instance, a study by [56] found that consumers who prioritize sustainability are more likely to view certified hotels as higher quality and are willing to pay a premium for these perceived benefits [57]. This suggests that the value proposition of certified hotels extends beyond environmental considerations to include overall guest satisfaction. However, for many consumers, the price remains a key determinant in their decision to book a hotel. While they may recognize the benefits of staying at a certified hotel, the willingness to pay extra for these benefits depends on their individual financial situation and the perceived cost–benefit ratio.

6.2. Factors Influencing the Willingness to Pay (WTP) for Certified Hotels

The willingness to pay (WTP) for certified hotels is influenced by a combination of demographic, psychological, and situational factors. Understanding these factors can help hotels better target their marketing efforts and adjust pricing strategies to appeal to different consumer segments.

6.2.1. Demographic Factors

Demographic factors, such as age, income, education, and cultural background, play a significant role in determining the WTP for certified hotels. Studies show that younger travelers, particularly Millennials and Generation Z, are more willing to pay a premium for eco-friendly accommodation compared to older generations [57]. These younger travelers tend to place a higher value on environmental sustainability and are more likely to choose hotels that align with their values.

Income also affects the WTP, with higher-income travelers generally being more willing to pay extra for certified hotels. This is particularly evident in luxury tourism, where eco-certifications like LEED or EarthCheck are often seen as a mark of prestige and exclusivity. In contrast, budget-conscious travelers may be less willing to pay a premium for sustainability unless they perceive clear financial benefits, such as reduced energy costs or water savings [58]. As highlighted by [59], consumers' willingness to pay for tourism services is influenced by multiple factors, such as environmental awareness, demographic variables, and post-pandemic shifts in consumer behavior. These insights align with the

growing recognition of the WTP as a critical indicator for promoting eco-tourism and sustainability efforts.

6.2.2. Cultural Values and Social Norms

Cultural values and social norms also influence consumer behavior and the WTP for certified hotels. For example, travelers from northern European countries, such as Germany and Scandinavia, tend to place a greater emphasis on sustainability and are more likely to choose certified hotels, even if it means paying more [60]. In contrast, travelers from countries where environmental awareness is lower may prioritize other factors, such as price or convenience, over sustainability.

In addition to cultural values, social norms play a role in shaping the WTP. Travelers who perceive sustainability as a socially desirable behavior, whether through peer influence or societal expectations, are more likely to pay a premium for certified hotels [61]. This is particularly relevant in the context of group travel, where individuals may feel pressure to conform to the environmentally conscious preferences of their companions.

6.2.3. Personal Values and Environmental Attitudes

Personal values and environmental attitudes are among the most significant predictors of the WTP for certified hotels. Travelers who strongly identify with environmental values and view themselves as responsible consumers are more willing to pay extra for eco-friendly accommodation [62]. This is consistent with the theory of planned behavior, which suggests that individuals are more likely to engage in pro-environmental behaviors if they have positive attitudes in regard to those behaviors, believe that they have control over their actions, and perceive that there is social support for their decisions [63].

For these consumers, staying at a certified hotel represents a way to align their travel choices with their values. They may also see it as an opportunity to support businesses that prioritize sustainability, further reinforcing their willingness to pay a premium for certified accommodation [57].

Furthermore, these findings align with the theory of planned behavior [63], as consumers' willingness to pay for certified hotels stems from positive attitudes toward sustainability, social norms encouraging eco-friendly choices, and their perceived ability to act on these preferences. Additionally, certifications such as LEED and Green Key can be interpreted through signaling theory, where certifications act as quality signals, reducing information asymmetry and helping consumers identify hotels that meet their sustainability expectations.

6.2.4. Situational Factors

Situational factors, such as the purpose of travel and the location of the hotel, also affect the WTP. For example, business travelers may be less concerned with sustainability certifications if they are traveling for work and have limited discretion over the choice of accommodation. In contrast, leisure travelers, particularly those engaging in eco-tourism or nature-based travel, are more likely to prioritize certifications and express a higher WTP for sustainable accommodation [64].

Similarly, the location of the hotel can influence the WTP. Hotels located in environmentally sensitive areas, such as coastal regions or national parks, may attract travelers who are more willing to pay extra to ensure that their stay has a minimal impact on the environment. In these cases, certifications like Green Key or EarthCheck serve as important indicators that the hotel is managing its environmental footprint responsibly [64].

6.2.5. Practical Implications for Hotels

The observed consumer preference for certified hotels resonates with the potential for practical applications, such as analyzing client reviews. Similar approaches, as demonstrated by [12] in exploring fair working conditions in Barcelona hotels, highlight how employee satisfaction can influence guest perceptions. Extending this line of research to sustainability efforts could provide measurable outcomes and enhance the understanding of consumer behavior.

Understanding consumer perceptions and the WTP for certified hotels has important implications for hotel management and marketing strategies. To maximize the benefits of certifications, hotels need to effectively communicate the value of their sustainability efforts to consumers. This can be achieved through transparent marketing that highlights the specific environmental benefits of certifications, such as reductions in energy use or waste generation [50].

Hotels should also consider segmenting their target market based on demographic and psychographic factors, tailoring their pricing strategies to appeal to different consumer segments. For example, eco-conscious travelers may be willing to pay a premium for certified hotels, while price-sensitive travelers may need to be incentivized with cost savings or other tangible benefits. Figure 1 presents a conceptual model developed by the authors, illustrating the interconnected impact of hotel certifications on environmental sustainability, economic benefits, and consumer behavior.

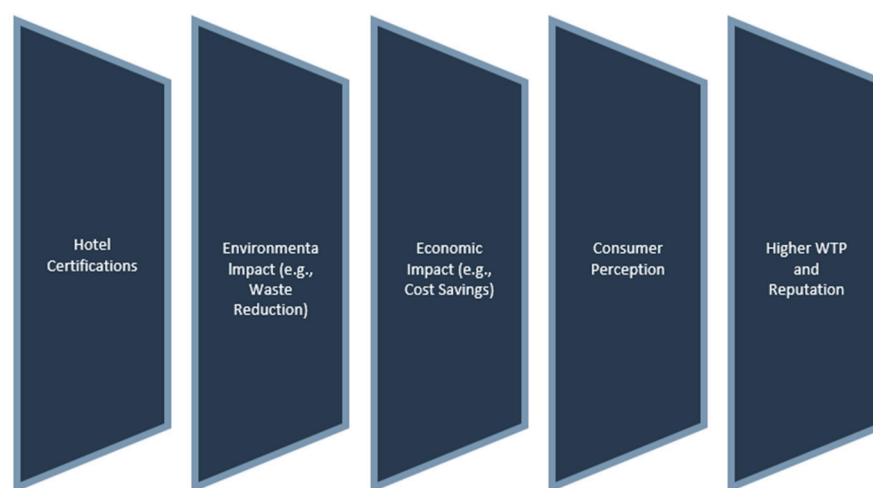


Figure 1. The interconnected impact of hotel certifications on environmental sustainability, economic benefits, and consumer behavior (Source: The authors).

Moreover, hotels can enhance the perceived value of certifications by integrating them into the overall guest experience. For instance, hotels can offer eco-friendly amenities, such as reusable water bottles or organic toiletries, to reinforce their commitment to sustainability. By creating a holistic, environmentally conscious experience, hotels can increase guest satisfaction and loyalty, while justifying the premium associated with certified accommodation. Sustainability certifications have demonstrated measurable impacts on both the consumer's willingness to pay (WTP) and operational outcomes for certified hotels. Consumers consistently show a preference for hotels that prioritize sustainability, as evidenced by reported increases in the WTP and improved satisfaction ratings.

Hotel managers can leverage certifications as competitive differentiators by clearly communicating the tangible benefits to guests, such as reduced energy costs and improved environmental performance. Offering eco-friendly amenities like reusable water bottles or organic toiletries can enhance the perceived value of certified hotels, particularly among eco-conscious travelers. Policymakers, on the other hand, should consider providing

financial incentives, such as tax breaks or subsidies, to lower the barriers for smaller hotels seeking certifications. Such initiatives would support the broader adoption of sustainability practices across the hospitality sector.

While high initial costs remain a significant barrier, programs such as the European Union's LIFE initiative provide financial support for sustainability certifications, demonstrating the feasibility of government-backed incentives. Similarly, the Green Key certification offers training and consultancy services to address resource and expertise gaps, making certifications more accessible to small businesses. Efforts by the Global Sustainable Tourism Council to harmonize standards further reduce the complexity of the process and encourage broader adoption of certifications.

7. Challenges and Barriers to Hotel Certification Adoption

Despite the many benefits of hotel certifications in promoting sustainability, operational efficiency, and consumer trust, numerous challenges hinder their widespread adoption. Hotels, especially small and medium-sized enterprises (SMEs), face significant barriers to achieving and maintaining certifications, due to financial, operational, and perceptual obstacles. This section explores the key challenges faced by hotels in adopting certifications, including cost constraints, resource limitations, management resistance, a lack of consumer awareness, and concerns over greenwashing.

7.1. High Initial Cost and Financial Constraints

One of the most significant barriers to hotel certification adoption is the high initial cost associated with obtaining and maintaining certifications [65]. Many certification programs require hotels to make substantial investments in upgrading their infrastructure to meet environmental standards. These upgrades may include energy-efficient lighting systems, water-saving technologies, waste management solutions, and sustainable building materials. While such investments lead to long-term cost savings, the upfront expenses can be prohibitive for many hotels, particularly smaller establishments.

For example, certifications like LEED and ISO 14001 demand not only an initial assessment fee, but also ongoing compliance costs related to monitoring, audits, and continuous improvements [66]. Smaller hotels, with limited budgets, may struggle to justify this expenditure, especially if their profit margins are already thin. Moreover, the financial burden of obtaining certification can be compounded by the need to hire external consultants or auditors to help hotels navigate the complex certification process [67].

Governments and certification bodies have recognized this barrier and, in some cases, provide financial incentives, such as subsidies or tax breaks, to help offset the cost of certification. However, these support mechanisms are not universally available and many hotels remain deterred by the perceived financial burden [68].

7.2. Resource Limitations

Closely tied to financial constraints are resource limitations, including access to skilled labor, time, and expertise. For many hotels, particularly smaller and independent ones, the resources required to implement the necessary sustainability measures for certification are scarce. Achieving certification often demands specialized knowledge of sustainability practices, environmental management systems, and compliance with legal requirements, which may be beyond the capacity of existing hotel staff [69].

In addition, certification processes can be time consuming. Hotel management and staff must allocate significant time and effort to prepare for audits, gather documentation, and implement operational changes. For smaller hotels, which often operate with limited staff, this additional workload can disrupt day-to-day operations and strain human

resources. Larger hotel chains may have dedicated sustainability teams to manage the certification process, but smaller establishments frequently lack the capacity to invest in such specialized roles [41].

7.3. Resistance from Management and Staff

Another key challenge in the adoption of hotel certifications is resistance from management and staff [70]. In some cases, hotel management may be reluctant to pursue certification due to perceived risks or costs associated with the process. They may view certification as a complex and bureaucratic endeavor that offers limited immediate financial returns. This attitude is particularly common in regions where consumer demand for certified hotels is low or where environmental concerns are not a priority [71].

Resistance can also stem from staff members who may be hesitant to adopt new operational practices or undergo additional training. Sustainable practices, such as recycling, energy monitoring, and eco-friendly housekeeping, often require changes to established routines, which can be met with resistance, particularly if staff members are not adequately trained or motivated. A lack of proper communication and training on the benefits of certification can exacerbate this resistance [72].

To overcome this challenge, it is essential for hotel management to foster a culture of sustainability and ensure that both management and staff are committed to the goals of certification. Providing clear incentives, such as demonstrating how certifications can enhance the hotel's reputation, reduce costs, and attract new customers, can help mitigate resistance and encourage buy-in from all levels of the organization.

7.4. A Lack of Consumer Awareness and Demand

A significant barrier to hotel certification adoption is the lack of consumer awareness and demand for certified hotels. While eco-conscious travelers are becoming more prevalent, many consumers are still unfamiliar with the concept of hotel certification and the specific benefits they offer. Research indicates that although consumers may be aware of sustainability in general, they often lack an understanding of what certifications like Green Key, LEED, or EarthCheck actually entail.

This lack of consumer knowledge can discourage hotels from pursuing certification, as they may perceive that the additional costs and efforts will not translate into increased demand or higher room rates. Hotels in regions where environmental awareness is lower may be particularly reluctant to invest in certification, as they may not see a significant return on investment from their local clientele [73].

Moreover, even when consumers are aware of hotel certifications, price remains a major consideration. Travelers, particularly budget-conscious ones, may prioritize cost over sustainability and opt for non-certified hotels if they perceive the price difference to be substantial. This presents a challenge for hotels seeking certification, as they must strike a balance between offering competitive prices and recouping the cost of certification [57].

7.5. Greenwashing and Certification Credibility

Greenwashing, or the practice of making misleading claims about a company's environmental practices, presents a challenge to the credibility of hotel certification. Some hotels may engage in greenwashing by promoting themselves as eco-friendly without adhering to rigorous sustainability standards. This undermines consumer trust in genuine certifications and can make it difficult for certified hotels to differentiate themselves in the marketplace [74].

To combat greenwashing, certification bodies have increasingly emphasized transparency and third-party verification. Certifications like ISO 14001 and EarthCheck require independent audits to ensure that hotels meet their sustainability criteria, offering con-

sumers greater confidence about the validity of the certification. However, certifications that rely on self-assessment or are perceived as lenient may struggle to maintain credibility in regard to environmentally conscious travelers [28].

Moreover, the proliferation of certification schemes can create confusion among consumers, making it difficult for them to distinguish between credible certifications and less rigorous ones. As a result, hotels may find it challenging to select the most appropriate certification for their brand and target market, particularly if they are operating in regions where multiple certification schemes are available [75].

7.6. Regulatory and Legal Barriers

In some cases, regulatory and legal barriers can impede the adoption of hotel certifications. Hotels operating in countries with weak environmental regulations may face limited pressure from authorities to adopt certifications, making it difficult to justify the cost and effort associated with certification. Conversely, in regions with stringent environmental regulations, hotels may struggle to navigate complex legal requirements, especially if those requirements conflict with the criteria of certification bodies.

Moreover, the lack of harmonization between national and international certification schemes can create additional challenges. Hotels that cater to international guests may need to comply with multiple certification standards, depending on the origin of their clientele. This can lead to confusion and added complexity for hotels seeking to achieve certification that appeals to a global audience [76]. Environmental certifications often operate at the intersection of industry self-regulation and formal regulatory frameworks. As [77] highlights, systems like Building Environmental Assessment Methods (BEAMs) exemplify how voluntary standards can complement regulatory measures, creating benchmarks for sustainability within industries.

8. Case Studies on Successful Certification Implementation

Hotel certifications provide a structured framework for implementing sustainable practices, but their real-world impact is best illustrated through successful case studies. These examples demonstrate how hotels have utilized certifications to not only improve their environmental performance, but also to enhance their operational efficiency, guest satisfaction, and market competitiveness. In this section, we examine several notable case studies involving hotels that have successfully implemented environmental certifications, including Green Key, ISO 14001, LEED, and EarthCheck.

8.1. The Green Key Certification: Radisson Blu Hotel, Athens

The Radisson Blu Hotel in Athens, Greece, provides a compelling example of how the Green Key certification can enhance a hotel's sustainability efforts, while increasing its attractiveness to eco-conscious travelers. As a hotel located in a busy urban center, Radisson Blu faces challenges common to many city hotels, such as high energy consumption, water use, and waste generation. However, through its Green Key certification, the hotel has made significant strides in reducing its environmental footprint.

To achieve Green Key certification, the Radisson Blu Hotel implemented a comprehensive environmental management system that included the installation of energy-efficient lighting and HVAC systems, the use of low-flow water fixtures, and a robust recycling program. The hotel also focused on reducing single-use plastics by providing guests with reusable alternatives, such as refillable water bottles and eco-friendly toiletries [78].

One of the key benefits of Green Key certification for the Radisson Blu Hotel was the increased visibility and trust among eco-conscious travelers. By promoting its certification on booking platforms and in marketing materials, the hotel was able to differentiate

itself from its competitors and attract guests who prioritize sustainability. In addition to improving its environmental performance, the Radisson Blu Hotel reported a 15% reduction in energy consumption and a 10% reduction in water use, leading to significant cost savings over time [78].

The Green Key certification not only helped the hotel improve its environmental impact, but also enhanced its reputation among international travelers. Guests staying at the hotel expressed higher satisfaction with the eco-friendly initiatives, citing them as a reason for choosing the hotel over others in the city. This case study highlights how Green Key certification can drive both environmental and economic benefits, making it an attractive option for hotels looking to balance sustainability with profitability.

8.2. ISO 14001: Accor Hotels' Commitment to Environmental Management

Accor Hotels, one of the world's largest hospitality groups, has for a long time been a leader in regard to sustainability, with several of its properties certified under the ISO 14001 environmental management system (EMS). ISO 14001 provides a framework for hotels to systematically reduce their environmental impact, focusing on energy efficiency, waste management, and compliance with environmental regulations. Accor's success with ISO 14001 implementation is best illustrated by its Novotel Amsterdam City property.

Novotel Amsterdam City adopted ISO 14001 in the early 2000s, as part of the group's global sustainability initiative. The hotel implemented several energy-saving measures, including installing energy-efficient boilers and lighting systems, as well as introducing a comprehensive waste management program that emphasizes recycling and waste reduction [79]. The hotel also developed a water management plan that included the installation of water-efficient fixtures and the reuse of greywater for landscaping purposes.

One of the standout features of the ISO 14001 certification process at Novotel Amsterdam City was the focus on continuous improvement. The hotel established sustainability targets that were reviewed annually, with performance tracked through energy and water usage data. This commitment to ongoing improvement not only ensured compliance with ISO 14001, but also helped the hotel achieve significant cost savings. Over a five-year period, Novotel Amsterdam City reduced its energy consumption by 25% and its water consumption by 20%, demonstrating the long-term financial benefits of ISO 14001 certification.

Moreover, ISO 14001 certification enhanced Accor's reputation as a global leader in sustainable hospitality. The group leveraged the certification to strengthen its brand's appeal to corporate clients, many of whom value sustainability as part of their corporate social responsibility (CSR) policies. This case study illustrates how a large hotel group can successfully implement ISO 14001 across multiple properties, achieving both environmental and financial gains, while reinforcing its commitment to sustainability.

8.3. LEED Certification: The Proximity Hotel, North Carolina

The Proximity Hotel in Greensboro, North Carolina, stands out as one of the most successful examples of a LEED-certified hotel, having achieved the prestigious LEED Platinum certification. LEED (Leadership in Energy and Environmental Design) is a globally recognized green building certification that evaluates buildings based on their environmental performance, including energy efficiency, water conservation, and the use of sustainable building materials.

From its inception, the Proximity Hotel was designed to meet LEED Platinum standards, making it the first hotel in the United States to achieve this level of certification. The hotel's sustainability efforts began with the construction phase, where 87% of construction

waste was recycled and over 40% of the building materials were sourced from within 500 miles of the hotel to reduce transportation emissions [80].

The Proximity Hotel incorporated numerous innovative features to meet the LEED certification criteria, including solar panels that provide 60% of the hotel's hot water, ultra-efficient HVAC systems, and regenerative elevators that reduce energy use by capturing energy as they descend. The hotel also implemented water-saving fixtures and a green roof that reduces stormwater runoff and insulates the building, thereby lowering heating and cooling costs.

The environmental benefits of LEED certification at the Proximity Hotel are complemented by significant economic gains. The hotel reported a 40% reduction in energy costs and a 30% reduction in water usage compared to conventional hotels, demonstrating the financial viability of sustainable building design. Additionally, the Proximity Hotel has become a case study for sustainable tourism, attracting eco-conscious travelers and industry professionals interested in green building practices.

The success of the Proximity Hotel illustrates the long-term benefits of investing in LEED certification, not only in terms of environmental performance, but also in terms of cost savings and market differentiation. By positioning itself as a leader in sustainable hospitality, the hotel has established a loyal customer base and set a high standard for other hotels looking to pursue LEED certification.

8.4. EarthCheck Certification: Soneva Fushi, Maldives

Soneva Fushi, a luxury resort located in the Maldives, is a leading example of how EarthCheck certification can drive sustainability in the hospitality sector. EarthCheck is a science-based certification that focuses on reducing the environmental footprint of tourism businesses, particularly in sensitive ecosystems like the Maldives. The certification assesses hotels on a wide range of criteria, including greenhouse gas emissions, energy and water consumption, waste management, and biodiversity conservation.

Given its location in a fragile marine environment, Soneva Fushi has made sustainability a central focus of its operations. To achieve EarthCheck certification, the resort implemented a comprehensive sustainability management system that addressed its energy, water, and waste management practices. The resort invested in solar power to meet its energy needs, reducing its reliance on diesel generators and installed a desalination plant to produce drinking water on-site [81].

Soneva Fushi also introduced an ambitious waste management program aimed at achieving zero waste. The resort composts organic waste, recycles plastics and glass, and has eliminated single-use plastics across the property. Additionally, the resort actively engages with the local community and marine conservation organizations to protect the surrounding coral reefs and marine life.

EarthCheck certification has not only enhanced the environmental credentials of the resort, but has also contributed to its financial success. The sustainability initiatives of the resort have resulted in cost savings through reduced energy and water consumption, while its commitment to sustainability has attracted high-end travelers seeking eco-luxury experiences. Guests at Soneva Fushi are willing to pay a premium for the resort's environmentally responsible practices, reinforcing the economic benefits of EarthCheck certification (<https://soneva.com/sustainability-and-stewardship> (accessed on 3 August 2024)).

9. Future Trends in Hotel Certification and Sustainability

The hotel industry is undergoing significant transformations, driven by heightened consumer awareness of environmental issues, stricter regulatory frameworks, and advances in technology [82]. As sustainability becomes an essential aspect of hospitality management,

hotel certifications will continue to evolve to meet new challenges and opportunities. This section explores the future trends in hotel certification and sustainability, including increased transparency, the integration of technology, the focus on social responsibility, certification standardization, and the alignment with broader sustainability goals like the United Nations Sustainable Development Goals (SDGs).

Technological advancements, such as IoT-enabled monitoring systems, can be seamlessly integrated into certification schemes to automate the tracking of energy, water, and waste metrics, as seen in the LEED certification framework. Similarly, expanding certification criteria to include social responsibility metrics, such as sourcing from local suppliers or engaging in community development, can align certifications with broader sustainability goals. Programs like Green Key and EarthCheck could introduce “Community Engagement” modules, further enhancing their relevance in a socially conscious market.

9.1. Increased Transparency and Third-Party Verification

One of the most important trends in hotel certification is the growing demand for transparency in regard to the certification process [28]. As consumers become more informed about environmental issues, they are also becoming more skeptical of companies’ sustainability claims. This has led to increasing concerns about greenwashing, when businesses present themselves as more environmentally friendly than they are in practice [28]. To address this, certification programs are placing a greater emphasis on third-party verification and more stringent auditing processes.

Third-party verification ensures that hotels meet the specific criteria required for certification and are subject to ongoing assessments to maintain their certification status. Certifications, such as ISO 14001 and EarthCheck, are already well-known for their rigorous third-party auditing and this trend is likely to grow as consumer expectations increase. Additionally, certification providers will likely provide more detailed information to consumers about a hotel’s environmental performance, including measurable data, such as on reductions in energy consumption, water use, and waste generation [83].

Future studies could expand on this research by conducting detailed qualitative or quantitative analyses of customer reviews of eco-certified hotels. This would provide a deeper understanding of the relationship between sustainability efforts and client satisfaction, supporting practical applications for hotel managers to enhance service delivery and the hotel’s reputation.

Another aspect of transparency is the shift toward publicly accessible data on certified hotels. Digital platforms that allow guests to see the specific sustainability measures taken by certified hotels will become more common. This transparency builds trust between consumers and hotel brands, as guests can verify the environmental claims of the hotel they are staying in.

This review makes several contributions to the literature and practice. It bridges environmental, economic, and consumer perspectives by synthesizing the impacts of hotel certifications. Grounded on the theory of planned behavior and signaling theory, the findings highlight the importance of certifications in driving sustainability and influencing consumer behavior. From a practical standpoint, this paper offers actionable insights for hotel managers to integrate certifications into their operations and for policymakers to support certification adoption through financial incentives. These contributions provide a foundation for future research and implementation strategies in regard to sustainable hospitality.

9.2. Integration of Technology and Data-Driven Sustainability

The role of technology in enhancing sustainability practices in the hospitality sector is rapidly expanding [84]. Hotels are increasingly adopting smart technologies to monitor

and reduce their environmental footprint. In the future, the use of artificial intelligence (AI), the Internet of Things (IoT), and big data analytics will become integral to sustainability management and certification compliance.

AI and IoT technologies can be used to track energy consumption, water use, and waste generation in real time, allowing hotels to make data-driven decisions to optimize their operations. For example, IoT sensors can monitor room occupancy and adjust heating, cooling, and lighting, accordingly, leading to significant energy savings [84]. Similarly, smart water management systems can track water usage patterns and detect leaks, reducing water waste.

Data analytics will also play a crucial role in helping hotels meet the criteria for various certifications. By analyzing energy and water consumption data, hotels can identify inefficiencies and target areas for improvement, ensuring they meet the requirements of certifications such as LEED, ISO 14001, or EarthCheck [85]. As technology advances, certification bodies may also adopt digital platforms to streamline the certification process, making it easier for hotels to track their sustainability performance and submit data for audits.

9.3. A Focus on Social Responsibility and Ethical Practices

While environmental sustainability has traditionally been the focus of hotel certifications, there is increasing emphasis on social responsibility and ethical business practices. Future hotel certifications will likely integrate more social criteria, such as fair labor practices, community engagement, and support for local economies. This shift reflects a broader understanding of sustainability that includes not just environmental factors, but also social and economic impacts.

Certifications like Travelife and Fair Trade Tourism already incorporate social responsibility into their criteria, assessing hotels on their labor standards, community involvement, and contribution to local development [86]. In the coming years, more certification programs are expected to follow suit, with greater attention paid to how hotels treat their employees, engage with local communities, and promote diversity and inclusion in their operations.

Furthermore, guests are becoming increasingly interested in ethical travel options that prioritize social justice and human rights. Hotels that can demonstrate a strong commitment to social responsibility will be better positioned to attract this growing segment of travelers. Certifications that incorporate social sustainability will help hotels differentiate themselves as ethical businesses, appealing to consumers who are seeking both environmentally and socially responsible accommodation [87].

9.4. Certification Standardization and Global Alignment

The proliferation of different certification schemes across the world has created confusion among both hotels and consumers [88]. While certifications such as ISO 14001, LEED, and EarthCheck are globally recognized, many regions and countries have their own local certification programs. This lack of standardization can make it difficult for consumers to understand the significance of various certifications and for hotels to choose the right certification for their brand.

In the future, we are likely to see a trend toward the harmonization of certification standards. Organizations, such as the Global Sustainable Tourism Council (GSTC), are working to create universal standards for sustainable tourism, which could lead to a more streamlined certification process for hotels [89]. As global efforts to combat climate change and promote sustainability intensify, certification programs may align their criteria with

international agreements, such as the Paris Agreement or the United Nations Sustainable Development Goals (SDGs).

This global alignment of certification standards will make it easier for hotels operating in different markets to obtain certification and for consumers to make informed choices based on universally recognized criteria [90]. Furthermore, alignment with international sustainability goals will encourage hotels to contribute to broader global efforts to address issues such as climate change, poverty, and inequality [89].

9.5. Connection to Broader Sustainability Goals (SDGs)

As sustainability becomes a core principle in the hospitality industry, hotel certifications are likely to align more closely with the United Nations Sustainable Development Goals (SDGs). The SDGs encompass a wide range of sustainability issues, including clean energy (SDG 7), responsible consumption and production (SDG 12), and climate action (SDG 13), among others [91]. Hotel certifications that explicitly address these global goals will be seen as leaders in promoting sustainable development.

For example, certifications that encourage energy efficiency and the use of renewable energy will directly contribute to SDG 7, which aims to ensure access to affordable, reliable, sustainable, and modern energy for all [92]. Similarly, certifications that promote waste reduction and recycling will help hotels support SDG 12, which focuses on sustainable consumption and production patterns.

Hotels that adopt certifications aligned with the SDGs will not only enhance their environmental and social sustainability, but will also strengthen their brand as global citizens, contributing to the achievement of these critical global objectives. Moreover, as consumers become more aware of the SDGs, they are likely to favor hotels that demonstrate a commitment to these goals through their certification efforts [2].

Table 3 summarizes the practical implications derived from the study, offering actionable recommendations for tourism companies in regard to the adoption of more sustainable practices. These guidelines address critical areas, including strategic planning, consumer communication, employee training, community collaboration, technology adoption, and performance measurement. For instance, companies are encouraged to align their certifications with operational goals and enhance transparency by highlighting measurable impacts, such as energy savings or waste reduction. Furthermore, leveraging advanced technologies like IoT and engaging with local communities not only supports environmental goals, but also enhances corporate social responsibility (CSR). By addressing financial and operational barriers, these recommendations aim to empower tourism companies to integrate sustainability into their core strategies effectively, aligning with global sustainability goals.

Table 3. Practical guidelines for tourism companies to implement sustainable practices.

Implication	Implementation
Incorporate certifications into strategic planning	Identify certifications aligned with operational goals and market demographics. Conduct cost–benefit analyses to reduce operational costs through energy savings and waste reduction. Clearly communicate the purpose and benefits of certifications via marketing channels.
Enhance consumer communication	Highlight measurable impacts (e.g., carbon footprint reduction) to build trust and increase the WTP. Offer eco-friendly amenities to reinforce sustainability messaging.
Leverage employee training and engagement	Train employees on sustainable housekeeping, waste management, and energy-efficient practices. Create incentive programs to reward innovative sustainability ideas.

Table 3. *Cont.*

Implication	Implementation
Collaborate with local communities	Partner with local suppliers to source sustainable and regionally produced goods. Engage in community-focused initiatives, such as tree planting and beach cleanups, to demonstrate CSR.
Adopt advanced technologies	Use IoT solutions to monitor and optimize resource consumption in real time. Leverage data analytics to track sustainability metrics and report progress to stakeholders.
Address barriers to certification adoption	Advocate for subsidies, tax breaks, or low-interest loans to support certification efforts. Offer consultancy services to guide businesses through certification processes.
Measure and publicize the impact	Regularly measure performance metrics (e.g., energy savings, waste reduction, customer satisfaction). Publish annual sustainability reports to maintain accountability and highlight progress made.

Source: The Authors.

10. Concluding Remarks

The hospitality industry is increasingly embracing sustainability as a core aspect of its operations, driven by growing consumer demand for environmentally responsible travel options and the necessity to reduce the environmental impacts of tourism. Hotel certifications, such as ISO 14001, LEED, Green Key, and EarthCheck, have emerged as essential tools in regard to this transformation, providing frameworks for hotels to reduce resource consumption, minimize waste, and enhance their overall operational efficiency. These certifications not only contribute to environmental sustainability, but also offer significant economic benefits through cost savings and market differentiation.

Throughout this review, we have examined the development, different types, and impact of hotel certifications, highlighting their role in promoting environmental and economic sustainability. Case studies on successful certification implementation, such as those of the Radisson Blu Hotel in Athens, the Proximity Hotel in North Carolina, and Soneva Fushi in the Maldives, demonstrate the tangible benefits of adopting certified sustainability practices. These examples show how certifications can lead to substantial reductions in energy and water use, enhanced waste management, and improved biodiversity conservation, all while increasing profitability and guest satisfaction.

Consumer perceptions play a pivotal role in the success of certified hotels. As eco-conscious travelers become more prevalent, their willingness to pay (WTP) for certified hotels is driving market demand for sustainability in the hospitality sector. Certifications provide hotels with a competitive edge by signaling to guests that the property adheres to rigorous environmental standards, thus fostering loyalty and higher occupancy rates [93]. However, for many consumers, the understanding of what certifications entail remains limited and hotels must focus on transparent communication to fully capitalize on the benefits of certification.

Despite these advantages, the path to certification is not without challenges. High initial costs, resource limitations, and resistance from hotel management and staff are common barriers that can prevent hotels, particularly small and medium-sized enterprises (SMEs), from pursuing certification. Additionally, the proliferation of certification schemes and concerns about greenwashing can erode consumer trust. To address these challenges, certification bodies must offer more support in terms of financial incentives, clearer guidance, and stronger third-party verification mechanisms.

Looking forward, the future of hotel certification will likely be shaped by several key trends. Increased transparency, driven by consumer demand for more credible and verifiable sustainability claims, will become a cornerstone of certification programs. Technological advancements, such as smart building systems and real-time monitoring, will enable hotels to track and optimize their sustainability efforts more effectively. Furthermore, certifications are expected to expand their focus beyond environmental sustainability to include social responsibility, aligning with broader global sustainability goals, such as the United Nations Sustainable Development Goals (SDGs).

In conclusion, hotel certifications are a powerful catalyst for promoting sustainability in the hospitality industry. They provide a pathway for hotels to reduce their environmental impact, enhance operational efficiency, and respond to the growing demand for eco-friendly travel options. By overcoming existing barriers and embracing future trends, hotels can leverage certifications to not only improve their environmental performance, but also gain a competitive advantage in an increasingly sustainability-conscious market. As the world moves toward a more sustainable future, hotel certifications will continue to play a crucial role in shaping the industry's contribution to global sustainability efforts.

10.1. Theoretical Implications

This study advances the theoretical understanding of sustainability in the tourism and hospitality sectors by integrating existing frameworks with practical insights from environmental certifications. It enriches the triple bottom line theory by demonstrating tangible outcomes, such as energy savings, waste reduction, and consumers' willingness to pay (WTP), thereby linking sustainability practices with economic and environmental benefits. By validating the theory of planned behavior (TPB), this study highlights how positive attitudes toward certifications, social norms, and perceived behavioral control influence consumer behavior, reinforcing the role of certifications in decision-making processes. Additionally, this study contributes to signaling theory by showing how certifications act as credible signals of quality and environmental responsibility, enhancing consumer trust and satisfaction. Furthermore, the integration of emerging technologies, such as IoT and data analytics, bridges innovation diffusion theory with sustainability, emphasizing how technological advancements accelerate the adoption of eco-friendly practices. This study also sheds light on corporate social responsibility (CSR) by exploring collaborations with local communities and the role of certifications in balancing profit making with social and environmental stewardship. Finally, it provides a framework for future research by identifying underexplored areas, such as the impact of lesser-known certifications, regional variations, and post-pandemic shifts in consumer behavior, thereby creating opportunities to expand and test existing theories in evolving contexts.

10.2. Limitations of the Study and Future Research

Our study provides valuable insights into the impact of hotel certifications on environmental sustainability, economic outcomes, and consumers' willingness to pay (WTP). However, it is subject to certain limitations such as: (i) the reliance on secondary data; the absence of primary data limits the ability to perform detailed statistical analyses and draw generalizable conclusions. (ii) Generalizability; findings from this study are derived from a selection of existing research and case studies, which may not fully represent all the regions, hotel types, or certification systems. For example, the focus on certain well-documented certifications (e.g., Green Key, LEED, EarthCheck) might overlook emerging or less popular certifications that are also impactful in specific contexts. (iii) Contextual variability; the impacts observed in one region or cultural context may not be directly applicable to another. The findings in this study, therefore, should be interpreted with caution when applied

to different contexts. (iv) The timeframe of the data; the reviewed studies span a broad timeframe (2000–2024). While this timeframe ensures a historical perspective is taken into account, differences in methodologies and temporal factors across the studies could influence the consistency of the results. (v) Limited statistical analysis; given the reliance on secondary data, the statistical analyses were limited to summarizing and synthesizing existing findings rather than performing inferential or predictive analyses. While the thematic synthesis and descriptive summaries provide valuable insights, they cannot establish causality or predict future trends with high precision. (vi) Consumer perception data; the consumer perception data analyzed in this study are derived from journal-reported results and not primary surveys or interviews. This limits the ability to probe deeper into individual consumer motivations, preferences, or barriers related to hotel certifications. The integration of regulatory measures and green technological advancements provides a strong foundation for the evolution of environmental certifications. [94] emphasize that corporate innovation in response to environmental regulations has a significant impact on the green economy, reinforcing the potential for certifications to drive systemic change in terms of sustainability.

To address future research directions, some future research could involve (i) primary data collection through surveys, interviews, or experiments to obtain more granular insights into consumer behavior and hotel operations; (ii) the exploration of lesser-known certifications and their impacts in underrepresented regions; (iii) the incorporation of advanced statistical methods to establish causality and predict trends; and (iv) the examination of evolving consumer attitudes toward sustainability in a post-2024 context, considering the role of global challenges, such as climate change and economic shifts.

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