

Article

Environmental Sustainability Practices in Family-Owned Accommodation SMEs: Assessing Performance Through Competitive Advantage

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Abstract

Family-owned accommodation enterprises, including small and medium-sized enterprises (SMEs), play a critical role in tourism economies, yet their contribution to environmental sustainability transitions remains underexamined. Drawing on the Resource-Based View (RBV), this study examines the relationship between environmental sustainability practices and perceived business performance in family-owned accommodation SMEs in Greece, considering cost advantage and differentiation advantage as parallel mediators. Data were collected through a structured questionnaire completed by representatives of 136 family-owned accommodation SMEs between March and April 2026. Environmental sustainability practices were measured as the breadth of adoption of 22 operational practices related to energy efficiency and low-carbon technologies, water conservation and management, and waste reduction and circular resource management. Business performance was assessed through a broad perceptual composite, whereas cost advantage and differentiation advantage were assessed using reflective multi-item scales. The results show that environmental sustainability practices were positively related to perceived business performance, cost advantage, and differentiation advantage. In the main mediation model, the indirect association through cost advantage was statistically significant, whereas the indirect association through differentiation advantage was not statistically significant. These findings suggest that, in family-owned accommodation SMEs, operational environmental practices may be more readily connected with business outcomes through resource efficiency, cost control, and operational consistency than through a differentiation pathway. The study refines the application of the Resource-Based View by showing how established competitive mechanisms operate when sustainability is represented by the breadth of specific operational practices in the resource-constrained context of family-owned accommodation SMEs.

Keywords: environmental sustainability practices; sustainable tourism; accommodation SMEs; family businesses; resource efficiency; competitive advantage; business performance; Greece



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1. Introduction

The transition toward sustainable tourism has become increasingly important in response to climate change, resource depletion, environmental degradation, and the need for more resilient economic systems. Accommodation businesses depend heavily on energy, water, and materials for heating, cooling, hot water, laundry, cleaning, food services, and guest amenities [1,2]. They also generate waste streams that can be addressed through

reduction, reuse, and recycling practices [3]. These operational pressures are accompanied by broader climate-related risks, as tourism depends strongly on climate-sensitive natural resources and destinations differ considerably in their exposure and capacity to adapt to climate change [4].

Accommodation enterprises can respond through environmental sustainability practices related to energy efficiency and low-carbon technologies, water conservation and management, and waste reduction and circular resource management. Such practices may generate environmental and business benefits, but these benefits are not necessarily produced through the same mechanism. Water-management measures, for example, can reduce both water and energy use and lead to utility-cost savings [2], while the implementation of reduce, reuse, and recycle strategies has been associated with improved business performance in hospitality firms [3]. Environmental practices that are visible to guests may also contribute to customer satisfaction and loyalty [5]. Nevertheless, previous research indicates that the relationship between environmental action and firm performance is not always direct and may differ across sectors and business contexts [6,7]. It is therefore important to examine the competitive mechanisms through which environmental sustainability practices may be associated with business performance.

This question is especially relevant to small and family-owned accommodation enterprises. Research on small- and medium-sized accommodation businesses shows that sustainability practices may support cost savings, competitiveness, and financial performance, but their adoption is also influenced by limited resources, informal structures, and the priorities of owner-managers [8]. Evidence from micro-sized accommodation enterprises further shows that the perceived relevance of different sustainability practices depends on the characteristics of the accommodation product and the motivations of its owners [9]. Family ownership introduces additional considerations. Family control and long-term orientation may foster concern for business continuity and stakeholder relationships, but family ownership does not automatically lead to greater adoption of sustainability practices [10]. Its relationship with environmental action is contingent on factors such as firm size and the extent of family involvement in management [11]. Family-owned accommodation SMEs therefore provide a distinct context in which environmental priorities, family goals, operational requirements, and resource limitations interact. These characteristics may facilitate direct and flexible implementation of operational changes, but they may also limit the firm's ability to convert environmental practices into competitive value when financial, technological, and managerial resources are insufficient.

The Resource-Based View (RBV) provides a useful framework for understanding how environmental sustainability practices may be linked to competitive and business outcomes. The theory argues that firms achieve superior outcomes when they possess and effectively use resources and capabilities that create value and are difficult for competitors to replicate [12,13]. However, the general pathway linking environmental action, competitive advantage, and performance is already well established in the literature. López-Gamero et al. found that firm resources and competitive advantage mediate the relationship between environmental management and financial performance, and that the relevant type of competitive advantage differs across sectors [6]. In the Greek hotel sector, Leonidou et al. demonstrated that organizational resources and capabilities support environmental marketing strategies, which, in turn, are associated with competitive advantage and performance [14]. Wang et al. examined hotel eco-innovation and distinguished between cost and differentiation advantages, showing that the two pathways may have different relationships with hotel performance [15]. Similarly, Pereira-Moliner et al. found that sustainability was positively associated with cost advantage, differentiation advantage, and performance in Spanish three-, four-, and five-star hotels [7].

Although these studies provide a strong foundation, they leave several questions open. First, they mainly examine broad environmental management strategies, environmental marketing, eco-innovation, or multidimensional sustainability constructs. Less attention has been given to the breadth of adoption of specific operational practices across energy, water, and waste management. Second, the closest studies have generally examined broader hotel populations rather than family-owned accommodation SMEs as a distinct context [6,7,14,15]. Research on family firms has focused mainly on whether and under what conditions these businesses adopt sustainability practices, rather than on the competitive mechanisms connecting operational environmental practices with business performance [10,11]. Bibliometric evidence also indicates growing scholarly attention to sustainability reporting and disclosure in family firms, particularly in relation to family ownership, corporate governance, and environmental performance [16]. Third, existing research does not clearly establish whether cost advantage and differentiation advantage operate as equally relevant parallel pathways in small, resource-constrained family accommodation businesses. Environmental practices may produce relatively direct internal benefits through reduced resource consumption and improved cost control, whereas differentiation benefits may require customer visibility, credible communication, and integration into the guest experience.

Greece provides a relevant setting for examining these relationships. Tourism activity is economically important and geographically concentrated, with the Southern Aegean accounting for the largest share of both travel receipts and overnight stays in 2024 [17]. The Greek accommodation sector is also characterized by pronounced seasonality [18], which can intensify operational pressures during peak periods, particularly in destinations facing water scarcity or limitations in water-management infrastructure [2]. Previous research on small family accommodation businesses in Greece shows that business, ownership, and family-related characteristics are relevant to operational efficiency [19]. Case-based evidence from a Greek tourism SME also shows that sustainability innovations can produce resource-related, operational, and economic benefits, although their implementation depends on firm-specific conditions and partnerships [20]. However, systematic evidence on the competitive pathways linking environmental sustainability practices with business performance in Greek family-owned accommodation SMEs remains limited.

Against this background, the present study examines the association between environmental sustainability practices and business performance in family-owned accommodation SMEs in Greece. Environmental sustainability practices are captured through the breadth of adoption of specific measures related to energy efficiency and low-carbon technology adoption, water conservation and management, and waste reduction and circular resource management. The study examines both the direct association between these practices and business performance, and their indirect associations through cost and differentiation advantages, which are assessed simultaneously as parallel competitive pathways.

The study contributes to the literature in three ways. First, it adopts a practice-based approach by examining the breadth of implementation of specific operational environmental measures rather than treating sustainability only as a broad strategy, orientation, or innovation construct. Second, it provides a contextual refinement of the Resource-Based View by examining whether two established competitive mechanisms operate similarly within small, family-owned accommodation enterprises. The theoretical contribution, therefore, does not lie in proposing a new general RBV pathway but in examining how established competitive mechanisms operate within a resource-constrained family-business context. Third, the study extends existing hospitality evidence by examining cost and differentiation advantages simultaneously in a sample of family-owned accommodation SMEs operating across seasonal, island, and mainland destinations in Greece.

2. Literature Review and Hypothesis Development

2.1. Environmental Sustainability Practices and Business Performance

Environmental sustainability practices refer to specific operational actions intended to reduce environmental impacts and improve the use of natural resources. In accommodation businesses, these practices are commonly related to three areas: energy efficiency and low-carbon technology adoption, water conservation and management, and waste reduction and circular resource management. Energy-related measures include energy-efficient lighting and appliances, energy-control systems, solar water heating, and renewable-energy technologies [1,21]. Water-related measures include low-flow fixtures, reduced laundry frequency, rainwater harvesting, and water-reuse systems [2,22]. Waste-related practices include waste minimization, sorting, reuse, recycling, the reduction in single-use materials, and organic-waste management [3,23]. These measures are consistent with circular economy principles when they reduce resource inputs, extend resource use, and limit waste generation [3,24,25].

Environmental sustainability practices may be associated with business performance because energy, water, materials, and waste management are closely connected with the daily operation and cost structure of accommodation enterprises. Energy-efficiency and renewable-energy measures can reduce energy consumption and related operating costs [21], while water-management interventions can reduce water use and, in some cases, the energy and costs associated with it [2,22]. Waste prevention, reuse, and recycling can support more efficient resource management and have been positively associated with business performance in hospitality firms [3]. Customer-facing environmental practices may also contribute to service-related outcomes by strengthening guests' perceived value, satisfaction, participation intentions, and loyalty [5,26].

Previous research has identified positive relationships between environmental practices and different dimensions of hotel performance. In small and medium-sized accommodation enterprises, environmental cost savings have been positively associated with financial performance, while responsible business practices have also been linked with competitiveness [8]. Environmental and quality-management practices have been associated with hotel competitiveness and financial performance [27], while sustainability has been positively related to cost advantage, differentiation advantage, perceptual performance, and selected objective performance indicators [7]. Evidence from small hotels further indicates that environmental practices can contribute to operational and competitive outcomes, with better results reported among hotels that voluntarily commit to green policies than among those responding primarily to external pressure [28].

However, the business value of environmental sustainability practices should not be considered automatic. Previous findings indicate that their relationship with performance may vary depending on the environmental activities examined, the competitive mechanism involved, the time horizon, and the business's characteristics [6,15]. Complementary capabilities may be needed to convert environmental action into competitive value. In the hotel sector, proactive environmental strategies have been associated with eco-innovation, which can strengthen green core competence, while green core competence has been linked with green competitive advantage [29]. This suggests that adopting individual practices alone may not be sufficient unless the enterprise develops the capabilities to implement and use them consistently.

The family-business context may shape this process through firm-specific knowledge, relationships, and governance characteristics, commonly described as the "familiness" of the enterprise [30]. A long-term orientation may also encourage family tourism businesses to consider business continuity and future value when making sustainability-related decisions [10]. However, family ownership does not automatically result in stronger sustain-

ability engagement, and its relationship with environmental practices may vary according to firm size and the extent of family involvement in management [11]. Small accommodation enterprises may also face limited financial resources, environmental knowledge, managerial time, technological capacity, and access to external support [9,31–33]. In the present study, family ownership is therefore treated as an organizational context rather than as an independently tested explanatory variable. The analysis examines whether the breadth of environmental practices is associated with business performance within small, resource-constrained family-owned accommodation enterprises.

The Resource-Based View provides the theoretical basis for this relationship. Individual environmental measures are not necessarily strategic resources on their own. Their potential value depends on whether they become integrated into the routines and capabilities of the enterprise and contribute to more efficient resource use, improved operational processes, service delivery, or customer value [12,13]. Based on this reasoning, the following hypothesis is proposed:

H1. *Environmental sustainability practices are positively associated with business performance.*

2.2. Cost Advantage as a Performance Mechanism

Within the Resource-Based View framework introduced in the previous section, environmental sustainability practices may create business value when they become integrated into operational routines that improve the use and control of key resources [12,13]. In the present study, cost advantage refers to the firm's ability to control operating expenses, improve operational efficiency and consistency, and obtain savings through more efficient resource and energy management [7,34,35]. Conceptually, it is treated as an intervening competitive capability rather than as a financial performance outcome or a general strategy of competing through lower prices.

Because accommodation operations are resource-intensive, environmental practices may affect recurring operating costs. Energy-efficiency measures and renewable-energy technologies can reduce energy consumption and related expenses [21]. Water-management interventions can reduce water use and, in some cases, the associated energy and utility costs [2,22]. Evidence from European small and medium-sized accommodation and food-service providers further indicates that resource-efficiency investments can reduce utility costs and generate measurable financial returns [36]. In small hotels, environmental practices have also been associated with improved resource utilization and cost savings [28].

Empirical research provides support for the association between environmental practices and cost-related benefits. Garay and Font found that environmental cost savings were positively related to financial performance among small and medium-sized accommodation enterprises [8]. Pereira-Moliner et al. reported a positive association between sustainability and cost advantage in Spanish hotels [7]. Research on smaller hotel companies also indicates that environmental practices are frequently adopted to improve efficiency and reduce costs, reflecting the operational priorities of owners and managers [37]. Together, these findings suggest that environmental sustainability practices may strengthen cost advantage when they reduce resource consumption, limit operational waste, and improve control over recurring expenses.

However, the evidence regarding the subsequent relationship between cost advantage and performance is not uniform. López-Gamero et al. found that firm resources and competitive advantage mediated the relationship between environmental protection and financial performance, but the relevant mechanism differed between sectors. Cost advantage was associated with financial performance in the industrial component of their study, whereas differentiation advantage was the relevant mechanism in the hotel compo-

nent [6]. Wang et al. similarly found that hotel eco-innovation was positively associated with cost advantage, but cost advantage was not significantly associated with short-term hotel performance [15]. These findings indicate that cost-related benefits may depend on the type of environmental activity, the business context, and the period required for initial investments to produce observable returns.

Other hospitality evidence provides more direct support for cost savings as an intervening mechanism. Yenidogan et al. examined the parallel roles of cost reduction and revenue enhancement in the relationship between environmental management and hotel profitability. Their findings showed that the cost-saving effects of environmental participation were positively associated with profitability [38]. This supports the view that environmental practices may contribute to business performance not merely through their adoption, but through the operating benefits that follow from more efficient resource management.

The cost pathway may be particularly relevant in the present context of family-owned accommodation SMEs, as small accommodation enterprises may face financial, human-resource, knowledge-related, technological, and implementation constraints when adopting environmental measures [32]. Some practices may also involve substantial initial investment and maintenance requirements [32], while evidence from hotel eco-innovation indicates that cost-related benefits may not be reflected in short-term performance [15]. Within the Resource-Based View, cost advantage can therefore be understood as a mechanism through which environmental practices may be converted into business value [12,13]. Hotel evidence further indicates that cost-saving effects can form a positive indirect pathway between environmental management and profitability [38].

Based on these arguments, the following hypotheses are proposed:

H2. *Environmental sustainability practices are positively associated with cost advantage.*

H3. *Cost advantage mediates the relationship between environmental sustainability practices and business performance.*

2.3. Differentiation Advantage as a Performance Mechanism

In addition to cost-related benefits, environmental sustainability practices may be associated with differentiation advantage. In the present study, differentiation advantage refers to an accommodation enterprise's ability to provide higher service quality, a broader range of complementary services that add value to guests, and a superior overall experience compared with competing establishments [7,34,35]. It therefore represents a general service- and experience-based advantage rather than green brand differentiation.

Environmental sustainability practices may contribute to differentiation when they are reflected in customer value and the accommodation experience. Environmental and quality-management practices have been positively associated with hotel competitiveness and financial performance [27], while guests' recognition of green-hotel practices has been linked with satisfaction and loyalty [5]. Perceptions of water-conservation and waste-reduction practices have also been associated with hedonic and utilitarian value, participation intentions, and loyalty intentions [26]. Accommodation businesses with recognized green practices have been found to receive higher customer satisfaction and electronic word-of-mouth evaluations, particularly when they also possess a recognizable green image [39]. These findings suggest that operational practices are more likely to contribute to differentiation when guests recognize them or when they become reflected in the value and quality of the accommodation experience. Green image and environmental communication, however, are not measured in the present study and are not treated as components of differentiation advantage.

Environmental action may also contribute to competitive advantage when it is connected with market-facing organizational capabilities. Leonidou et al. found that an environmental marketing strategy was positively associated with competitive advantage in Greek hotels and that this advantage was subsequently associated with market and financial performance [14]. Their study examines an explicitly market-oriented strategy rather than the adoption of individual operational practices. It nevertheless demonstrates that environmental action can produce competitive value when it is supported by the capabilities required to connect it with the market.

More direct evidence supports differentiation advantage as a mechanism between environmental action and performance. López-Gamero et al. found that differentiation advantage was the relevant mechanism linking environmental protection with financial performance in the hotel sector [6]. Wang et al. identified differentiation advantage as a short-term pathway between hotel eco-innovation and performance [15]. Pereira-Moliner et al. also reported positive associations of sustainability with differentiation advantage, perceptual performance, average daily rate, and revenue per available room [7].

Although these studies use broader measures of environmental management, environmental marketing, eco-innovation, or sustainability, together they support examining whether the breadth of operational environmental practices is associated with differentiation advantage and, indirectly, with business performance [6,7,14,15].

Based on these arguments, the following hypotheses are proposed:

H4. *Environmental sustainability practices are positively associated with differentiation advantage.*

H5. *Differentiation advantage mediates the relationship between environmental sustainability practices and business performance.*

Although the two mechanisms are developed separately, the main analysis examines them simultaneously as parallel mediators in order to assess their independent indirect associations with business performance.

3. Materials and Methods

3.1. Research Design

This study employed a quantitative cross-sectional survey design to examine the direct association between environmental sustainability practices and perceived business performance in family-owned accommodation SMEs, together with their indirect associations through cost advantage and differentiation advantage.

3.2. Sample and Data Collection

The target population consisted of family-owned micro, small, and medium-sized accommodation enterprises operating in Greece. The enterprise was the unit of analysis, and each valid questionnaire represented one business. The study included formally organized accommodation establishments, such as hotels, rented rooms, furnished apartments, guesthouses, tourist residences, and villas. Peer-to-peer short-term rentals were excluded because the study focused on enterprises with identifiable organizational and operational structures.

At the conceptual level, family businesses were understood according to the common European definition, which emphasizes family control over the majority of decision-making rights and the formal involvement of at least one family representative in the governance of the firm [40]. For the purposes of sample screening, family-business status was operationalized through the question, “Is your business a family business?” with “Yes” and “No” response options. Classification was therefore based on respondents’ self-identification

of their enterprise as a family business rather than on the separate verification of family ownership percentages, decision-making rights, or the level of family involvement in management.

SME eligibility was assessed using the employee-number and balance-sheet thresholds established in Commission Recommendation 2003/361/EC [41]. Micro-enterprises were defined as firms with fewer than 10 employees and an annual turnover or balance-sheet total not exceeding EUR 2 million. Small enterprises were defined as firms with fewer than 50 employees and an annual turnover or balance-sheet total not exceeding EUR 10 million, while medium-sized enterprises were defined as firms with fewer than 250 employees and an annual turnover not exceeding EUR 50 million or a balance-sheet total not exceeding EUR 43 million. The questionnaire collected information on both employee numbers and financial characteristics. Seven responding firms were excluded because the reported number of employees and balance-sheet value exceeded the SME eligibility thresholds. For the descriptive analysis and the operationalization of firm size as a control variable, enterprises were classified according to employee number as micro, small, or medium-sized businesses.

A non-probability sampling approach combining purposive and convenience elements was employed. Businesses were identified primarily through the Hellenic Chamber of Hotels and online searches using publicly available contact information. A limited number of invitations were also sent through existing professional or personal contacts. After duplicate records were removed, the questionnaire was distributed electronically through Google Forms in March 2026. A reminder was sent three weeks later, and data collection continued through April 2026. Participation was voluntary and anonymous.

The questionnaire was sent to 1891 accommodation businesses. After excluding 416 undeliverable messages and 11 automated replies indicating seasonal closure or discontinued operation, 1464 contacts were considered potentially active. A total of 192 responses were received, corresponding to an adjusted response rate of 13.1%.

After data collection, 49 responses were excluded because the businesses were not family-owned, and seven were excluded because they exceeded the SME eligibility thresholds. The final analytical sample consisted of 136 family-owned accommodation SMEs.

The questionnaire was addressed to individuals with direct knowledge of the enterprise. Most respondents were owners, owner-managers, managers, or other senior representatives, while a smaller number were employees familiar with the firm's environmental practices, competitive position, and recent performance.

3.3. Measurements

The study included environmental sustainability practices as the independent variable, cost advantage and differentiation advantage as mediating variables, and business performance as the dependent variable. Firm size, type of operation, and geographic location were included as control variables.

Environmental sustainability practices were measured as specific and observable actions implemented by each enterprise. Each practice was coded as 0 when it was not implemented and 1 when it was implemented. This binary format was appropriate because the study aimed to capture the actual adoption of operational practices rather than general attitudes, intentions, or perceived commitment toward sustainability.

The initial selection and classification of the practices was informed primarily by the practice-based approach of Pérez López et al. [42], who classified hotels according to their adherence to multiple sustainability measures. The final instrument was not a direct replication of their framework. It was adapted to the scope of the present study, the characteristics of accommodation SMEs in Greece, and previous hospitality research [2,3,28,43,44]. It

included 22 practices grouped into three categories: energy efficiency and low-carbon technology adoption, water conservation and management, and waste reduction and circular resource management. Sustainability certification was recorded separately and was not included in the index.

For each enterprise, the Environmental Sustainability Practices (ESP) Index was calculated as the proportion of applicable practices adopted:

$$\text{ESP Index} = \text{Number of adopted applicable practices} / \text{Total number of applicable practices}$$

The index ranged from 0 to 1, with higher values indicating a broader adoption of environmental sustainability practices. For enterprises providing food services, all 22 practices were included. For enterprises without food services, organic-waste composting and food-surplus utilization were excluded from both the numerator and the denominator, resulting in 20 applicable practices. This prevented firms from receiving lower scores for practices that were not relevant to their operations.

The measure was treated as an unweighted index capturing the breadth of adoption. Each applicable practice contributed equally because the index was intended to measure the proportion of practices implemented, rather than their relative cost, complexity, environmental impact, or effectiveness. As the practices represent distinct and non-interchangeable aspects of environmental action, the measure was treated as an index-type rather than a reflective construct. Reflective validity criteria, including composite reliability (CR), average variance extracted (AVE), and the heterotrait–monotrait ratio (HTMT), were applied to cost advantage and differentiation advantage. For business performance, the same statistics were reported as measurement-quality diagnostics under a single-factor specification and were interpreted cautiously because the measure was designed as a broad multidimensional composite rather than as a unidimensional reflective construct.

Business performance was operationalized as a broad multidimensional composite measure of perceived changes across eight financial, operational, customer-related, and employee-related outcomes. The use of both financial and non-financial indicators reflects the multidimensional approach commonly applied to hotel performance measurement [45,46]. The perceptual approach enabled the assessment of financial and non-financial outcomes consistently across privately held enterprises for which the research team lacked comparable objective records. The financial and operational indicators included overall profitability, revenue per available room, operating cost, and occupancy rate. The non-financial indicators included guest satisfaction, repeat guest ratio, employee satisfaction, and employee turnover rate. Respondents evaluated how each indicator had changed during the previous three years using a five-point scale ranging from 1 = significantly decreased to 5 = significantly increased.

Cost advantage and differentiation advantage were each measured using three items developed with reference to previous research on generic competitive strategies and competitive advantage in hotel sustainability [7,34,35]. Respondents evaluated all items using a five-point Likert scale ranging from 1 = strongly disagree to 5 = strongly agree.

Cost advantage captured the enterprise's ability to control overall expenses and operating costs, achieve efficiency and consistency in service delivery, and generate cost savings through efficient resource and energy management. Differentiation advantage captured the ability to provide higher service quality, offer a greater variety of complementary services that add value to guests, and deliver an overall accommodation experience that is superior to that of competing establishments.

The differentiation measure therefore reflects general service and customer-experience differentiation rather than environmental branding, green communication, or environmental reputation specifically. Cost advantage and differentiation advantage were treated as reflective constructs, and their scores were calculated as the mean of their respective items.

To account for observable firm heterogeneity, three firm-level and contextual control variables were included: firm size, type of operation, and geographic location. Firm size was classified according to employee number as micro, small, or medium-sized. Previous research indicates that firm size and operating characteristics can be associated with the efficiency of small accommodation enterprises [19]. Type of operation distinguished between seasonal and year-round enterprises. This control was included because tourism activity in Greece is characterized by strong seasonal concentration, which may influence resource requirements, operating conditions, and performance [18]. Geographic location distinguished between island and mainland enterprises. Island accommodation businesses may operate under distinct financial, infrastructure, accessibility, and resource-related conditions that influence their operational decisions and resilience [47].

The numerical coding and reference categories used for the control variables are reported in the Data Analysis section.

3.4. Questionnaire Design

The questionnaire was developed in Greek and administered electronically through Google Forms. It was structured into three main sections. The first section collected information about the enterprise and the respondent, including family-business status, firm size, type of operation, geographic location, accommodation characteristics, and respondent position. The second section assessed the adoption of environmental sustainability practices through binary yes/no questions covering energy, water, waste, and resource management. It also recorded the possession of environmental or energy-related certification as a separate variable. The third section included the Likert-scale items measuring cost advantage, differentiation advantage, and business performance. The complete questionnaire items are presented in Table A1 (Appendix A).

The questionnaire items were selected from and adapted on the basis of the literature described in the Measurements section. Before the main data collection, the questionnaire was reviewed and pilot-tested with a small group of potential respondents to assess the clarity, relevance, and comprehensibility of the questions and their suitability for small accommodation enterprises. Feedback from this process was considered before the final distribution of the questionnaire.

Several procedural measures were used to reduce common method bias [48]. Participation was anonymous and voluntary, the main constructs were presented in separate sections, neutral wording was used, and the independent variable was assessed through binary responses rather than the Likert scales used for competitive advantage and business performance. These measures could reduce, but not eliminate, common method concerns; the related statistical diagnostics are described in the Data Analysis.

3.5. Data Analysis

Since all questionnaire items were required, the dataset had no missing values at the item level. The data were initially screened for coding errors, inconsistent responses, distributional anomalies, and potentially influential observations. PER3 and PER8 were reverse-coded before the business-performance score was calculated so that higher values consistently represented better performance. Descriptive statistics were calculated for the sample characteristics, individual environmental sustainability practices, and the main study variables.

Environmental sustainability practices were analyzed as an index representing the proportion of applicable practices adopted by each enterprise. Business performance, cost advantage, and differentiation advantage were calculated from their respective items as described in the Measurements section. Internal consistency was assessed using Cronbach's alpha, and Pearson correlation coefficients were calculated to examine the bivariate relationships among the main variables.

Additional measurement-quality diagnostics were conducted for the three multi-item measures. Composite reliability and average variance extracted were calculated using standardized loadings obtained from separate one-factor principal axis factor analyses. Composite reliability values of at least 0.70 and average variance extracted values of at least 0.50 were used as reference criteria [49]. Discriminant validity was assessed using heterotrait–monotrait ratios, with values below 0.85 interpreted as supporting discriminant validity [50]. Because business performance was operationalized as a broad multidimensional composite, its factor loadings and average variance extracted were interpreted cautiously.

Common method bias was assessed using the procedural measures described in the Questionnaire Design section and two statistical diagnostics. Harman's single-factor test was used as an initial assessment. Full collinearity diagnostics were then conducted by regressing each main variable on the remaining variables and calculating the corresponding variance inflation factor (VIF) as $1/(1 - R^2)$. Values below 3.3 were interpreted as indicating that full collinearity and common method effects were unlikely to represent serious concerns [51]. Conventional VIF and tolerance statistics were also examined to assess predictor multicollinearity.

Hierarchical multiple regression analysis was used to examine H1, H2, and H4. Firm size, geographic location, and type of operation were entered in Step 1, followed by the ESP Index in Step 2. Separate models were estimated for business performance, cost advantage, and differentiation advantage. Firm size was coded as 1 = micro, 2 = small, and 3 = medium-sized enterprise. Geographic location was coded as 0 = mainland and 1 = island, while type of operation was coded as 0 = seasonal and 1 = year-round.

The indirect associations proposed in H3 and H5 were examined using PROCESS Model 4 with 5000 bootstrap samples and 95% bias-corrected confidence intervals [52]. Cost advantage and differentiation advantage were first examined separately for supplementary purposes and were then entered simultaneously as parallel mediators in the main model. Firm size, geographic location, and type of operation were included as covariates. An indirect association was considered statistically significant when its bootstrap confidence interval did not include zero.

Exploratory analyses examined whether firm size, type of operation, geographic location, or environmental certification represented boundary conditions. For the moderation regressions, the ESP Index was mean-centered, and firm size was recoded as 0 = micro and 1 = small or medium-sized. Environmental certification was examined through separate PROCESS Model 7 analyses as a first-stage moderator of the cost- and differentiation-advantage pathways. All exploratory models controlled for firm size, type of operation, and geographic location, as applicable. The full specifications and results are reported in the Supplementary Materials.

A post hoc power analysis was conducted using the standard F test for R^2 deviation from zero. With $N = 136$, $\alpha = 0.05$, and an assumed medium effect size of $f^2 = 0.15$, estimated power was 0.961 for the four-predictor main regression models and 0.918 for the seven-predictor exploratory moderation models. These estimates concern medium-sized overall regression effects and do not establish power for smaller or indirect effects.

Potentially influential observations were assessed using Cook's distance [53]. As additional sensitivity checks, the main regression models were re-estimated after excluding cases above the conservative 4/N screening value, heteroscedasticity was examined through auxiliary regressions of squared standardized residuals on the model predictors, and the performance regression and mediation analysis were repeated after excluding the operating-cost item from the business-performance composite. Statistical significance was evaluated at the 0.05 level. The full diagnostic and sensitivity results are reported in Supplementary Tables S7 and S8.

4. Results

4.1. Sample Characteristics and Descriptive Analysis

The final sample consisted of 136 family-owned accommodation SMEs. Most firms were micro-enterprises (58.1%), followed by small firms (25.0%) and medium-sized firms (16.9%). The majority of businesses operated seasonally (74.3%), while 57.4% were located on islands. Adoption of environmental or energy-related certification was reported by 30.9% of firms. Most respondents were owners or owner-managers of the accommodation businesses. Descriptive statistics for the sample are presented in Table 1.

Table 1. Business Sample Characteristics.

Characteristic	Category	n	%
Firm size	Micro	79	58.1
	Small	34	25.0
	Medium	23	16.9
Location	Mainland	58	42.6
	Island	78	57.4
Operation type	Seasonal	101	74.3
	Year-round	35	25.7
Environmental certification	No	94	69.1
	Yes	42	30.9
Respondent position	Owner	64	47.1
	Manager	30	22.1
	Owner/manager	34	25.0
	Other	8	5.9

Adoption was concentrated mainly in established operational measures, whereas practices requiring specialized systems, infrastructure, or external coordination were less common. The most and least frequently adopted practices are presented in Table 2.

Table 2. Most and least adopted environmental sustainability practices.

Category	Most Adopted Practices	Adoption (%)	Least Adopted Practices	Adoption (%)
Energy efficiency and low-carbon technology adoption	LED lighting	94.1	BMS/EMS systems	14.7
	Solar water heaters	74.3	Carbon offsetting	11.8
	Energy-efficient appliances	69.9		
Water conservation and management	Dual-flush/low-consumption toilets	72.1	Rainwater harvesting	18.4
	Towel and linen reuse programs	58.8	Greywater treatment and reuse system	18.4

Table 2. Cont.

Category	Most Adopted Practices	Adoption (%)	Least Adopted Practices	Adoption (%)
Waste reduction and circular resource management	Recycling bins	61.0	External waste partnerships	16.2
	Food surplus utilization	51.2	Organic waste composting	16.3
	Internal waste separation	50.7		

Note. BMS = Building Management System; EMS = Energy Management System. Percentages for organic waste composting and food surplus utilization are based on valid responses from firms with food service.

4.2. Preliminary Analysis

The ESP Index indicated moderate adoption across the sample. Descriptive statistics, reliability coefficients, and correlations are presented in Table 3.

Table 3. Descriptive statistics, reliability, and correlations among main variables.

Variable	M	SD	α	1	2	3	4
1. Environmental sustainability practices	0.454	0.176	—	—			
2. Business performance	3.473	0.481	0.737	0.414 ***	—		
3. Differentiation advantage	3.878	0.716	0.803	0.243 **	0.320 ***	—	
4. Cost advantage	3.306	0.802	0.825	0.703 ***	0.514 ***	0.362 ***	—

Note. N = 136. Cronbach's alpha coefficients are reported in the α column. Pearson correlation coefficients are reported below the diagonal. ** $p < 0.01$; *** $p < 0.001$.

The competitive-advantage scales showed good internal consistency, while the broad business-performance composite showed acceptable internal consistency. All main variables were positively correlated (Table 3).

Cost advantage and differentiation advantage met the reference criteria for composite reliability and convergent validity. The business-performance composite showed acceptable composite reliability but low AVE under the single-factor specification, consistent with its broad multidimensional design. The HTMT results supported the empirical distinctiveness of the three measures. Detailed measurement-quality results are presented in Table 4. Standardized factor loadings and additional measurement-quality diagnostics are reported in Supplementary Table S1.

Table 4. Measurement-Quality Diagnostics for the Multi-Item Measures.

Panel A. Reliability and Single-Factor Diagnostics			
Measure	Cronbach's α	CR	AVE
Business performance	0.737	0.76	0.31
Cost advantage	0.825	0.84	0.63
Differentiation advantage	0.803	0.81	0.59
Panel B. HTMT Ratios			
	Cost Advantage	Differentiation Advantage	Business Performance
Cost advantage	—		
Differentiation advantage	0.45	—	
Business performance	0.66	0.41	—

Note. CR = composite reliability; AVE = average variance extracted; HTMT = heterotrait-monotrait ratio. PER3 and PER8 were reverse-coded because increases in operating costs and employee turnover indicate poorer performance. For business performance, CR and AVE were calculated under a single-factor specification and are reported as diagnostic evidence rather than as confirmation that the broad multidimensional composite is unidimensional.

All HTMT ratios were below the conservative 0.85 threshold. The ratio was 0.45 between cost advantage and differentiation advantage, 0.66 between cost advantage and business performance, and 0.41 between differentiation advantage and business performance. These findings support the empirical distinctiveness of the three measures. However, the HTMT results do not establish that the broad business-performance composite is unidimensional, and its single-factor diagnostics should therefore be interpreted cautiously.

Harman's single-factor test and full collinearity diagnostics did not indicate that common method effects represented a serious concern. The first unrotated factor explained 33.67% of the variance, and all full collinearity VIF values were below 3.3. Conventional collinearity diagnostics also showed no problematic multicollinearity. The full results are presented in Supplementary Table S2.

4.3. Associations Between Environmental Sustainability Practices and Business Performance, Cost Advantage, and Differentiation Advantage

Hierarchical regression analysis was conducted to examine the relationships of environmental sustainability practices with business performance, cost advantage, and differentiation advantage while controlling for firm size, geographic location, and type of operation. The results are presented in Table 5.

Table 5. Hierarchical regression results for H1, H2, and H4.

Predictor	Business Performance	Cost Advantage	Differentiation Advantage
Firm size	−0.001 (0.053), $\beta = -0.002$	0.013 (0.067), $\beta = 0.012$	−0.054 (0.082), $\beta = -0.058$
Location	0.000 (0.081), $\beta = 0.000$	0.239 * (0.104), $\beta = 0.148$	0.220 (0.127), $\beta = 0.152$
Seasonality	0.060 (0.094), $\beta = 0.055$	0.104 (0.120), $\beta = 0.057$	0.166 (0.147), $\beta = 0.102$
Environmental sustainability practices	1.145 *** (0.231), $\beta = 0.423$	3.185 *** (0.295), $\beta = 0.705$	1.106 ** (0.361), $\beta = 0.274$
R ²	0.172	0.514	0.085
Adjusted R ²	0.147	0.499	0.057
ΔR^2	0.155 ***	0.433 ***	0.066 **
F	6.818 ***	34.664 ***	3.024 *

Note. N = 136. Values are unstandardized coefficients with standard errors in parentheses, followed by standardized coefficients (β). Control variables were entered in Step 1, while environmental sustainability practices were entered in Step 2. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Environmental sustainability practices were positively associated with business performance ($\beta = 0.423$, $p < 0.001$), supporting H1. They were also positively associated with cost advantage ($\beta = 0.705$, $p < 0.001$), supporting H2, and with differentiation advantage ($\beta = 0.274$, $p = 0.003$), supporting H4.

The additional variance associated with environmental sustainability practices was greatest in the cost-advantage model ($\Delta R^2 = 0.433$), followed by the business-performance model ($\Delta R^2 = 0.155$) and the differentiation-advantage model ($\Delta R^2 = 0.066$). The complete models accounted for 51.4% of the variance in cost advantage, 17.2% of the variance in business performance, and 8.5% of the variance in differentiation advantage.

Among the control variables, island location was positively associated with cost advantage ($\beta = 0.148$, $p < 0.05$). Firm size and type of operation were not significantly associated with the dependent variables, while geographic location was not significant in the business-performance or differentiation-advantage models.

Regression diagnostics showed no problematic multicollinearity. Sixteen observations exceeded the conservative Cook's-distance screening value of $4/N$, although all Cook's-distance values remained well below 1.00. Re-estimating the three models without these cases produced the same substantive conclusions, and auxiliary residual regressions did

not indicate serious heteroscedasticity. The main analyses therefore retained the full sample. The full results are reported in Supplementary Table S7.

Sensitivity analyses using separate energy, water, and waste-management sub-indices broadly supported the main pattern of the findings. Energy and waste-management practices were positively associated with perceived business performance, while all three categories were positively associated with cost advantage. None showed an independent statistically significant association with differentiation advantage. The full results are reported in Supplementary Table S3.

4.4. Parallel and Supplementary Mediation Analyses

To examine the mediating roles of cost advantage and differentiation advantage, PROCESS Model 4 was employed while controlling for firm size, geographic location, and type of operation. The results are presented in Table 6.

Table 6. Main Parallel Mediation Analysis.

Indirect Association	B	SE/BootSE	95% CI
Total indirect association	0.893	0.287	[0.382, 1.508]
Indirect association via cost advantage	0.772	0.275	[0.287, 1.364]
Indirect association via differentiation advantage	0.120	0.075	[−0.003, 0.293]

Note. N = 136. BootSE = bootstrap standard error; CI = confidence interval. Indirect associations were estimated using PROCESS Model 4 with 5000 bootstrap samples and 95% bias-corrected confidence intervals. Firm size, geographic location, and type of operation were included as covariates. An indirect association was considered statistically significant when its confidence interval did not include zero.

In the parallel mediation model, the total indirect association was statistically significant, $B = 0.893$, $\text{BootSE} = 0.287$, 95% CI [0.382, 1.508]. The indirect association through cost advantage was positive and statistically significant, $B = 0.772$, $\text{BootSE} = 0.275$, 95% CI [0.287, 1.364], supporting H3. In contrast, the indirect association through differentiation advantage was not statistically significant, $B = 0.120$, $\text{BootSE} = 0.075$, 95% CI [−0.003, 0.293]. H5 was therefore not supported in the main parallel mediation model. These estimates represent statistical indirect associations rather than evidence of causal mediation.

In supplementary separate-mediator models, both cost advantage and differentiation advantage produced statistically significant indirect associations. However, the differentiation pathway did not remain significant when both mediators were examined simultaneously. Detailed results from the separate models are presented in Supplementary Table S4.

An additional sensitivity analysis recalculated perceived business performance after excluding the operating-cost item that was conceptually related to the cost-advantage measure. Environmental sustainability practices remained positively associated with the revised performance composite, and the indirect associations through both cost advantage and differentiation advantage were statistically significant. This indicates that the cost-related pathway did not depend solely on the overlapping item, while the differentiation-related result was sensitive to the composition of the performance measure. The full results are reported in Supplementary Table S8.

4.5. Exploratory Analyses

Exploratory analyses examined whether the main relationships varied according to firm size, type of operation, geographic location, or environmental certification. No statistically significant moderation was identified for perceived business performance or cost advantage. For differentiation advantage, firm size produced a statistically significant interaction, indicating a stronger positive relationship among micro-enterprises than among

small and medium-sized enterprises. Type of operation and geographic location were not significant moderators. The full results are presented in Supplementary Table S5.

Environmental certification did not significantly moderate the relationships of environmental sustainability practices with cost or differentiation advantage. Although the conditional differentiation-related indirect association differed in statistical significance across the two certification groups, the index of moderated mediation was not significant. Certification was therefore not supported as a moderator of either indirect pathway. The full results are presented in Supplementary Table S6.

5. Discussion

This study examined the relationship between environmental sustainability practices and perceived business performance in family-owned accommodation SMEs, considering cost advantage and differentiation advantage as parallel competitive mechanisms. Environmental sustainability practices were positively associated with all three outcomes. In the main mediation model, however, only cost advantage formed a statistically significant independent indirect pathway. Differentiation advantage was significant when examined separately but not when considered simultaneously with cost advantage.

The descriptive results showed that adoption was concentrated mainly in practices embedded in routine accommodation operations. Similar patterns have been identified among smaller hospitality businesses, where environmental involvement is often shaped by practical operational considerations [31] and by the perceived relevance of each practice to the accommodation product [9]. By contrast, practices requiring specialized technology, infrastructure, or external coordination, such as BMS/EMS systems, water-reuse systems, carbon offsetting, and structured waste partnerships, were less common. This is consistent with Chan et al. [32], who identified financial, human resource, knowledge-related, technological, and organizational barriers to environmental technology adoption. Kornilaki et al. [33] similarly showed that favorable attitudes do not necessarily lead to implementation when small tourism firms face contextual constraints, while Mannarino and Pupo [54] emphasized the role of organizational and financial obstacles in family and non-family firms. However, the present study did not directly measure the cost or complexity of each practice; the results, therefore, describe differences in adoption frequency rather than formally established categories of basic and capital-intensive measures.

The positive relationship between environmental sustainability practices and perceived business performance supports H1 and is consistent with previous hospitality research. Bagur-Femenias et al. [28] found that environmental practices in small hotels were positively related to operational performance and competitiveness. Garay and Font [8] found that environmental cost savings were positively related to financial performance and that other responsible practices supported competitiveness. A later comparative study also reported a positive relationship between corporate social responsibility and financial performance in tourism SMEs [55]. Ioannidis et al. [3] found that reduce, reuse, and recycle practices were related to performance outcomes in hospitality, and Perramon et al. [27] reported positive relationships between environmental and quality-management practices, competitiveness, and financial performance.

The present study extends this evidence by focusing on the breadth of specific energy-, water-, and waste-related practices rather than on a broad environmental strategy or corporate social responsibility construct. Nevertheless, the findings concern respondents' perceptions of business performance rather than objectively verified financial or operational outcomes.

Environmental sustainability practices were most strongly related to cost advantage. This finding is consistent with evidence that resource-efficiency measures may reduce utility expenses, improve resource use, and produce operational or economic benefits [36].

Evidence from a Greek tourism SME also shows that sustainability investments can generate operational and economic benefits, although their value depends on the technical and organizational conditions of implementation [20]. Bagur-Femenias et al. [28] similarly found that environmental practices in small hotels were more closely related to operational performance than to external competitiveness.

The strong cost-related relationship is also consistent with Calisto et al. [37], who found that smaller hotel companies often implement environmental strategies with an emphasis on efficiency and cost reduction. Many practices examined in the present study are directly connected with recurring resource use. Styles et al. [2] documented the saving potential of water-management practices in European hospitality, while Gatt and Schranz [22] showed that targeted interventions can reduce hotel water consumption. From a Resource-Based View perspective, however, the practices become strategically relevant only when they are integrated into routines that improve resource control and operational consistency.

Cost advantage also formed the only statistically significant independent indirect pathway in the parallel mediation model. This supports previous evidence that cost-saving operating benefits may connect environmental management with hotel profitability [38] and is consistent with the broader Resource-Based View argument that environmental action contributes to performance through intervening resources and competitive capabilities [6,12,13].

The specific role of cost advantage, however, differs from some earlier hotel studies. In the hotel component of López-Gamero et al. [6], differentiation rather than cost advantage was the relevant mechanism. Wang et al. [15] also found that hotel eco-innovation was related to cost advantage, but that differentiation represented the more relevant short-term pathway to performance. Pereira-Moliner et al. [56] similarly found that differentiation mediated the relationship between sustainability-related capabilities and objective hotel performance.

These differences may be explained partly by differences in measurement and research context. Earlier studies examined broader environmental management [6], eco-innovation [15], quality management, and organizational capability constructs [56], which include strategic and market-oriented activities beyond the implementation of individual operational practices. The present study focused on small, family-owned accommodation enterprises and on the breadth of specific operational measures, which may be more immediately connected with internal resource control than with market positioning. In the sensitivity analysis, excluding the operating-cost item from the performance composite, the indirect associations through both cost advantage and differentiation advantage were statistically significant. The cost-related pathway therefore did not depend solely on the overlapping item, but the change in the differentiation result indicates some sensitivity to the composition of the performance measure. No formal statistical contrast between the two indirect associations was conducted.

Environmental sustainability practices were also positively associated with differentiation advantage. This is consistent with evidence that environmental and quality-management practices may support competitiveness [27] and that recognized environmental practices may contribute to satisfaction, perceived value and loyalty [5,26].

Market-facing capabilities may strengthen this relationship. Leonidou et al. [14] found that environmental marketing strategies in Greek hotels were related to competitive advantage and performance. Gasbarro and Bonera [39] showed that green image plays an important role in linking green practices with customer satisfaction and word of mouth. Environmental certification has also been related to guest ratings [57], hotel market value [58], and competitive action [59]. These studies indicate that environmental practices may contribute more clearly to market differentiation when they are recognized and communicated.

In the present study, however, differentiation reflected general service quality, complementary services, and the overall accommodation experience rather than green image or environmental reputation.

Although differentiation advantage produced a statistically significant indirect association when examined separately, it did not remain significant in the main parallel model. This finding differs from López-Gamero et al. [6], Wang et al. [15], and Pereira-Moliner et al. [56], whose studies identified differentiation as an important pathway. One possible explanation is that the operational practices measured here may improve internal efficiency without automatically creating a visible distinction for customers.

Calisto et al. [37] support this interpretation by showing that smaller hotel companies place greater emphasis on efficiency and are less likely than larger groups to communicate environmental practices extensively. Ettinger et al. [60] similarly found that, even among small certified hotels, not all communicated sustainability activities were equally recognized in guest reviews. Therefore, adoption alone may not be sufficient to create an independent differentiation pathway. Nevertheless, this explanation remains tentative because the study did not measure communication, customer awareness, or green marketing. Shared variance between cost and differentiation advantage may also have contributed to the change between the separate and parallel models.

Environmental certification was also examined as an exploratory boundary condition. Certification did not significantly moderate the relationships between environmental sustainability practices and cost or differentiation advantage, and neither index of moderated mediation was statistically significant. Although the conditional indirect relationship through differentiation advantage was significant only among non-certified enterprises, the difference between certified and non-certified enterprises was not statistically significant. This does not contradict evidence linking certification to guest ratings, hotel market value, or competitive action [57–59], but it suggests that possession of certification alone may not alter how operational practices relate to competitive advantage. Its strategic value may depend on the certification scheme, external recognition, visibility, and integration into communication and service delivery, none of which were captured by the binary certification variable.

The exploratory moderation analyses showed no statistically significant evidence that the relationships with perceived business performance or cost advantage varied according to firm size, type of operation, or geographic location. Firm size, however, moderated the relationship with differentiation advantage, which was stronger among micro-enterprises. This is broadly consistent with Graafland [11], who showed that company size and family management shape environmental behaviour, and with Calisto et al. [37], who identified size-related differences in hotel sustainability strategies.

One possible explanation is that, in micro-enterprises, ownership, daily operations, and guest interaction are more closely connected. Environmental practices may therefore be more directly integrated into the identity and experience of the business. This interpretation is consistent with the concept of familiness developed by Habbershon and Williams [30], according to which family firms possess distinctive resources and relationships whose value depends on how they are used. However, owner involvement and guest recognition were not measured, and the moderation analysis was exploratory. The result should therefore be treated as a tentative boundary condition.

The broader family-business literature also shows that family ownership does not produce uniform environmental outcomes. Memili et al. [10] found that sustainability practices depend on the interaction between family ownership and long-term orientation. Agostino and Ruberto [61] reported a positive relationship between family ownership and environmentally friendly practices, whereas Miroshnychenko and De Massis [62] found

lower average engagement in several environmental practices among family firms. Miroshnychenko et al. [63] further demonstrated that family firms' environmental behavior varies considerably across firms, industries, and countries. These mixed results support treating family ownership as a context shaped by size, governance, resources, and management involvement rather than as an automatic source of sustainability advantage.

Taken together, the findings refine the application of the Resource-Based View to family-owned accommodation SMEs. Previous studies have established that environmental strategies and capabilities may contribute to competitive advantage and performance [6,7,14,15]. The present study extends this work by examining the breadth of specific operational practices and by assessing cost and differentiation advantages simultaneously. In line with Wernerfelt [12] and Barney [13], the results indicate that environmental practices do not automatically generate every form of competitive value; their contribution depends on the capabilities through which they are implemented and used. In this context, operational capabilities appear to connect environmental practices more directly with resource efficiency and cost control, whereas market-facing capabilities may be required to translate them into recognizable differentiation. The study therefore extends the Resource-Based View by demonstrating that the competitive value of environmental practices is context-dependent and shaped by the resource constraints and organizational characteristics of family-owned accommodation SMEs [11,19].

6. Conclusions

This study examined how the breadth of environmental sustainability practices is associated with perceived business performance in family-owned accommodation SMEs through cost advantage and differentiation advantage. Environmental practices were positively linked to cost advantage, differentiation advantage, and perceived business performance. In the main mediation model, cost advantage emerged as the only statistically significant independent indirect pathway, whereas the indirect pathway through differentiation advantage was not.

The findings suggest that the business value associated with operational environmental practices is more clearly reflected in resource efficiency, cost control, and operational consistency than in differentiation. The study refines the Resource-Based View by showing that the adoption of environmental practices does not automatically generate all forms of competitive value; their business value depends on the organizational capabilities through which they are integrated into operations and connected to the market.

6.1. Practical Implications

The findings suggest that family-owned accommodation SMEs should integrate environmental practices into operational management rather than treat them only as environmental responsibilities. Since cost advantage formed the only statistically significant independent indirect pathway in the main model, managers should prioritize the monitoring and reduction in recurring energy, water, material, and waste-related costs. The value of individual measures should be assessed in relation to implementation costs, maintenance requirements, expected savings, and the operational characteristics of each enterprise.

Policymakers, tourism-support institutions, and destination management organizations can support this process through financial incentives, technical assessments, training, and implementation guidance. A staged approach may be appropriate, beginning with resource monitoring and operational improvements before progressing to technologies and arrangements requiring greater investment, specialized expertise, or external coordination.

Operational adoption alone may not be sufficient to create differentiation. Enterprises seeking to connect environmental action with customer value may also require credible

communication, staff and guest engagement, and integration of environmental practices into the accommodation experience. Certification should not be treated as sufficient on its own, since its value may depend on the scheme's credibility and visibility and on how it is used within service delivery.

Destination-level infrastructure remains important because individual accommodation enterprises have limited control over water availability, waste systems, recycling networks, energy infrastructure, and access to specialized suppliers. Shared technical services, waste-management arrangements, training, joint procurement, and destination-wide initiatives may reduce these implementation barriers, particularly in seasonal and island destinations.

6.2. Limitations and Future Research

Several limitations should be considered. First, the cross-sectional design does not establish the temporal order or causal direction of the relationships. Enterprises with stronger performance and greater resources may be better able to adopt environmental measures. Longitudinal research is needed to examine how environmental practices and business outcomes develop over time.

Second, the study used a non-probability sample of 136 family-owned accommodation SMEs, with an adjusted response rate of 13.1%. Selection and non-response bias cannot be excluded, and the Greek accommodation context limits generalization to larger hotels, non-family firms, other tourism sectors, and different national or institutional settings. Enterprises with greater interest in environmental sustainability or stronger recent performance may have been more likely to participate, potentially resulting in higher adoption estimates and stronger observed associations. Family-business status was also based on respondents' self-identification rather than on detailed measures of family ownership, governance, generational involvement, or management participation. No a priori power analysis was conducted. Although the post hoc analysis indicated high power for detecting medium-sized overall regression effects, it did not directly assess power for smaller or bootstrapped indirect effects, which should therefore be interpreted cautiously.

Third, the main variables were reported by one representative per enterprise. Procedural measures and statistical diagnostics reduced, but could not eliminate, common method, response, and socially desirable reporting biases. Perceived business performance was not verified through objective records. Respondents with stronger sustainability engagement may also have evaluated recent business performance more favorably, potentially inflating some of the observed associations. Future studies should combine survey responses with financial, operational, resource-consumption, employee, and customer indicators.

The business-performance measure was designed as a broad multidimensional composite. Although it showed acceptable composite reliability, its AVE was low under the single-factor specification, and the employee-turnover item had a particularly weak loading. The findings should therefore be interpreted as a composite assessment across different performance areas. Future research could examine financial, operational, customer-related, and employee-related outcomes separately.

Fourth, environmental sustainability practices were measured as binary adoption indicators and combined into an unweighted index. The measure captures breadth but not implementation intensity, investment, environmental impact, complexity, effectiveness, or payback period. Although non-applicable food-service practices were excluded from the calculation, differences in the number and type of applicable practices may still affect interpretation. Future research could use intensity-based measures, alternative weighting approaches, or separate constructs for energy, water, and waste management.

Fifth, the reverse-coded operating-costs indicator in the business-performance composite is conceptually related to the resource- and energy-related cost-savings item in the

cost-advantage scale. When this item was excluded, the indirect associations through both cost advantage and differentiation advantage were statistically significant. This suggests that the cost-related result was not driven solely by conceptual overlap, and that the differentiation-related finding is sensitive to the composition of the business-performance composite. Future studies should use more clearly separated and dimension-specific measures of cost advantage and business performance.

Finally, the control variables were limited to firm size, type of operation, and geographic location. Other relevant characteristics may include firm age, accommodation category, ownership generation, family-management involvement, digital capability, financial capacity, service level, and previous sustainability investment. Environmental certification was captured only as a binary variable and did not reflect the scheme, scope, duration, recognition, or communication of certification. The exploratory moderation results, particularly the firm-size interaction, also require confirmation using larger and more balanced samples.

Future research could examine additional mechanisms, including innovation capability, managerial commitment, employee involvement, environmental communication, customer awareness, digitalization, access to finance, and stakeholder collaboration. Comparative and longitudinal studies across ownership structures, accommodation types, regions, and countries would further clarify how environmental practices are converted into operational, competitive, and business value.

Supplementary Materials: The following supporting information can be downloaded at <https://www.mdpi.com/article/10.3390/su18157824/s1>: Table S1: Standardized factor loadings and measurement-quality diagnostics; Table S2: Full collinearity diagnostics; Table S3: Sensitivity analysis using energy, water, and waste-management sub-indices; Table S4: Parallel and Supplementary Separate Mediation Analyses; Table S5: Exploratory moderation analyses; Table S6: Environmental certification as an exploratory boundary condition: moderated mediation results; Table S7: Additional regression diagnostics and influential-case sensitivity analyses; Table S8: Sensitivity analysis excluding the operating-cost item from perceived business performance.

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Data Availability Statement: The raw data supporting the findings of this article will be made available from the corresponding author upon reasonable request.

Conflicts of Interest: The authors declare no conflicts of interest.

Appendix A

Table A1. Measurement Items and Variables Used in the Study.

Construct/Scale	Code	Measurement Item
Environmental Sustainability Practices (1 = Yes, 0 = No)		
Energy Efficiency and Low-Carbon Technology Adoption	E1	LED lighting
	E2	Lighting motion sensors/timers
	E3	Key-card-controlled electricity system in rooms
	E4	Energy-efficient appliances
	E5	Heat pumps
	E6	Solar panels (PV)
	E7	Solar water heaters
	E8	Energy-efficient building features (e.g., double glazing)
	E9	BMS/EMS for energy monitoring
	E10	Carbon offsetting
Water Conservation and Management	WA1	Low-flow fixtures/sensor taps and showers
	WA2	Dual-flush or low-consumption toilets
	WA3	Towel/linen reuse program
	WA4	Rainwater harvesting system
	WA5	Greywater treatment and reuse system
Waste Reduction and Circular Resource Management	WM1	Recycling bins for guests
	WM2	Internal waste separation (paper, plastic, glass, etc.)
	WM3	Refill dispensers (no single-use toiletries)
	WM4	Reduction/elimination of single-use plastics
	WM5	Organic waste composting
	WM6	External waste-management partners
	WM7	Food surplus utilization (e.g., donation, reuse, staff meals)
Environmental Sustainability Certification Adoption	CERT	Environmental sustainability certification adoption
Differentiation Advantage (1 = Strongly disagree to 5 = Strongly agree)	DCA1	The services offered by our business are of higher quality compared to those of competitors.
	DCA2	Our business offers a greater variety of complementary services that add value to guests compared to competitors.

Table A1. Cont.

Construct/Scale	Code	Measurement Item
	DCA3	The overall experience provided by our accommodation is superior to that of competing establishments.
Cost Advantage (1 = Strongly disagree to 5 = Strongly agree)	CCA1	Our business effectively controls its overall expenses and operating costs.
	CCA2	Our business achieves high levels of efficiency and consistency in service delivery.
	CCA3	Our business achieves cost savings through efficient resource and energy management.
Performance (1 = Decreased significantly to 5 = Increased significantly)	PER1	Overall profitability
	PER2	Revenue per available room (RevPAR)
	PER3	Operating costs
	PER4	Occupancy rate
	PER5	Guest satisfaction (e.g., online reviews)
	PER6	Repeat guest ratio (customer retention)
	PER7	Employee satisfaction rate (ESR)
	PER8	Employee Turnover Rate (ETR)

Note. PER3 and PER8 were reverse-coded before calculating the business-performance composite because increases in operating costs and employee turnover indicate poorer performance.

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