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Spatial Analysis of Sustainability Measures from Agritourism in Iberian Cross-Border Regions

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Abstract: This research aims to evaluate whether agritourism is a sustainable activity, comparing the profiles of accommodation, farmers, and accommodation with agricultural activities. Four specific objectives drive this study: (a) examining the cultural/landscape, economic, environmental, and social indicators of sustainability; (b) comparing indicators of sustainability between groups; (c) revealing whether there is a significant cross-correlation between spatial distribution and its impact on sustainability metrics; (d) discussing the significance of these factors for tourism development policies. The present study uses various techniques to study the degree of equilibrium in the distribution of the accommodation and farms in relation to their sustainable impact. To verify this, we use the global Moran's I and G (d) tests proposed by Getis and Ord. As well as analyzing local contrasts, LISA (Local Indicators of Spatial Association) and Hot Spot analysis are used for mapping. The main results reveal different profiles of sustainability, highlighting the accommodation profile with the lowest contribution to sustainable development, while profiles where the relationship between agriculture and tourism is most visible seem to perform better. In general, the main results obtained suggest that there is no direct relationship between spatial distribution and sustainability inputs, excluding the potential of endogenous resources, and suggesting the existence of imbalances in the creation of agritourism products.

Keywords: agritourism; sustainable tourism; sustainable indicators; sustainable development; spatial statistics; spatial clusters; Moran's I; Getis–Ord G; LISA; cross-border regions

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Citation: Rodrigues Ferreira, D.I.; Loures, L.C.; Sánchez-Martín, J.-M. Spatial Analysis of Sustainability Measures from Agritourism in Iberian Cross-Border Regions. *Land* **2023**, *12*, 826. https://doi.org/10.3390/land12040826

Academic Editors: Guanghui Jiang, Yanbo Qu, Wenqiu Ma and Qinglei Zhao

Received: 28 February 2023
Revised: 27 March 2023
Accepted: 31 March 2023
Published: 4 April 2023

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1. Introduction

Farm-based tourism has recently attained more prominence in consumer vacation decisions, generating a new area for tourism product development [1]. Enhancing links between the tourism sector and agriculture constitutes an opportunity for inclusive economic and social growth, with a particularly strong impact in low-density regions. These links can help to create economic opportunities for local people, build resilience in rural areas and in small businesses, and enhance sustainable development in both sectors [2–4]. Despite these factors, some empirical evidence shows different views regarding the links between agriculture and tourism: on the one hand, difficulties arise due to the seasonal nature of tourism and the absence of a direct connection between agriculture and tourism [5]. On the other hand, a different scenario is detectable in Mexico [2], for example, where local agricultural production is an important aspect of the tourist industry.

Another important perspective is related to the role of agriculture in providing numerous attractions in rural areas, especially due to its capacity to contribute to preserving human and natural heritage and cultural landscapes, making positive contributions to human well-being [6]. The literature points out that the aesthetic value of agricultural landscapes is a requirement for the promotion of rural development, especially considering

that small-scale and traditional farms are perceived as rural idylls [7]; this extends to biological and ecological criteria [8] and increases the marginal value of agriculture's positive externalities [9].

Several studies have researched the connections between agriculture and tourism. Some seek to identify the practices, challenges, and opportunities for coexistence between the two sectors [1,10], while others aim to understand the economic significance of agritourism in relation to the full range of commercial links between the agriculture and tourism sectors [11,12]. Other studies analyze the food supply chains of tourism accommodation providers [13,14], or interrogate how strong links between tourism and food production systems may lead to more sustainable development [15]. The main results obtained indicate different scenarios: on the one hand, they demonstrate that there is no practical link between tourism and agriculture [1], while, on the other, some authors draw attention to the fact that "farmers and tourists can benefit from each other in various ways" [11]:552. Faced with this dual reality, the present study investigates the links between agriculture and tourism through the application of a range of indicators that measure the sustainability of these relationships.

Measurements of the sustainability of tourism activities have been implemented and expanded since the 1960s to assess related social and biophysical changes [16], as well the broad technical indicators (i.e., indirect/direct, descriptive/analytical, and subjective/objective) and discipline-based indicators (e.g., economic indicators, social indicators, tourism indicators, or psychological indicators) [17]. Summarizing the literature, Sardianou et al. [18] note that sustainable tourism must be focused on the economic, environmental, social, and cultural dimensions. However, more recently, other researchers have included supplementary dimensions to measure the political, management/institutional, and technological impacts in terms of the sustainability of touristic activities [19]. These dimensions are conducive to the principles of sustainable tourism, facilitating an approach that can be used to make all types of tourism more environmentally, socially, and economically beneficial; however, such an approach is only possible if tourism promotes the optimal use of resources [20].

Thus, to promote efficient management in tourism businesses, preventive measures are required to develop a sustainable tourism model. The most common indicator used is related to the environmental dimension [21], measuring quality protection and the quality of natural resources [22] or including dimensions to evaluate negative impacts [20], such as the loss of renewable/non-renewable resources, the rate of ecosystem destruction, and reuse/recycling rates [17]. Effective and appropriate management directions for promoting best performance in the environmental touristic dimension are frequently related to ecotourism practices [23,24]. Regarding the socio-cultural effects of tourism, the literature includes indicators such as the analysis of tourism development in local communities, the capacity to avoid rejection by the local population, or an evaluation of the indirect effects of tourism on the level of inhabitants' well-being [20]; other factors include social cohesion, cultural education and cultural (site) management, and the distribution of resources [17]. From an economic point of view, the literature includes indicators such as the impact of tourism on employment, income distribution/capital leakage, economic well-being, working conditions, and local government income [17].

Several studies have examined local inhabitants' and visitors' perceptions of the impacts of outdoor recreation and tourism in terms of its benefits and detrimental effects [25–28], the provider's perspective [29], or opinions on agritourism and other farm-based entrepreneurial ventures [30], suggesting that agritourism produces various economic, environmental, and social benefits. The main indicators applied allow for the evaluation of different dimensions of agritourism, as summarized in Table 1.

Table 1. Sustainability indicators.

Dimension	Description
Economic	• Farm household income • Farm gross sales • Diversification effect on farm profits • Employment of family members (in numbers) • Number of farm employees • Number of full-time employees • Diversification effect on employees • Revitalization of local economies • Enhancing the quality of life of local people • Enhancing the tourism appeal of rural areas
Socio-cultural	• Attachment to agriculture • Off-farm employment • Historic and cultural preservation • Preserving rural heritage and traditions • Sharing cultural heritage with visitors • Providing recreational activities for visitors • Attracting and retaining a population
Environmental	• Environmentally friendly farming • Stewardship practices • Preserving natural resources and ecosystems • Providing scenic beauty and landscapes • Educating visitors about agriculture or nature

Source: authors' own elaboration based on [26,30,31].

When analyzing the main results obtained in the studies identified in Table 1, we highlighted agritourism as a model for promoting sustainability from an economic standpoint (e.g., higher household incomes, job creation); it has more sociocultural benefits than other entrepreneurial models, with a particular impact on the preservation of rural heritage, increasing community pride, empowering female farmers, and improving farmers' social status. The agritourism model also produces positive environmental impacts through the conservation of biodiversity and natural resources, minimizing environmental damage [30]. On the other hand, the literature highlighted the need to communicate the economic and socio-cultural benefits that arise from agriculture activity (preserving cultural heritage,), while "enhancing the tourism appeal of rural destinations" [26]:14. Effectively, agritourism has been suggested as a sustainable entrepreneurial model [30], and is sometimes also presented as a touristic model that is more able to support climate change strategies in the following five dimensions [32]: enhancing natural, agricultural, cultural, and social capital, developing a new source of household income, protecting landscapes and environments by adopting, maintaining, or strengthening ancestral agricultural practices, and preserving crop diversity and native plants.

The long-term impact of agritourism has been studied in previous research. For example, studies have considered the impact of agritourism in purchase behavior [33] or intentions to purchase farm experiences [28].

Given the research objectives, our sustainability pattern analysis accounts for economic, environmental, social, and cultural/landscape dimensions; it also includes a global indicator that integrates all dimensions of sustainability. The analysis was intended to identify the existence of a global pattern of the distributions of the variables in the study area. On the other hand, we sought to verify whether there are local distribution patterns. Lastly, we analyzed the perceptions of 101 local stakeholders (accommodation managers and farmers) regarding the advantages of agricultural and tourism links. The novelty of the approach used in this article can be observed in the combination of the methodology applied and the specificity of the analyzed locations; due to their natural and cultural

characteristics, these places emerge as interior destinations that require sustainable tourism management strategies.

This study intends to identify whether there are links between agriculture and tourism, starting from the principle of the symbiotic relationship between agriculture and tourism that can be found in agritourism, and which is presented in the literature as a key element of environmentally and socially responsible tourism in rural areas [24]. In general, the patterns and dynamics of agritourism are unknown, as is their potential to develop cross-border territories marked by the abandonment of agricultural activity, the aging of the local population, and low business density, all of which must be urgently addressed. In order to achieve its objectives, this study is structured as follows: after this introduction, the next section serves a guide to some characteristics of the study area. Subsequently, we describe the methodology used in this research. The third section describes the results obtained; finally, we present a synthesis of the main conclusions in the fourth section.

2. Materials and Methods

2.1. Research Design

A methodology with four stages was designed (Figure 1). In the first step, a literature review was performed to identify the main gaps and support the questionnaire design to anchor the creation of sustainable indicators. We carried out observation field trips to collect information photographs and to compile statistical and cartographic data that allowed for the characterization of the territory. In the second step, the questionnaire was given to farmers and accommodation managers in order to collect data and information that allow for the identification of the main characteristics and to detect links with agricultural activity. Therefore, a database was created using Excel and SPSS version 27 software to support the statistical analysis and structure the creation of indicators. Both databases enabled the authors to design and develop a Geographical Information System application using ArcGISs v.10.8., which brings together geographical data and patterns regarding the sustainability of agritourism with dynamic information. The last stage consisted of data analysis and treatment, as detailed in Section 2.5.

2.2. Questionnaire Design

A questionnaire addressed to the accommodation households and to farmers was designed and implemented. Based on the aims of the study, the survey was developed to collect information that would allow for the characterization of the accommodation in the study area, the identification of the respondents' relationships with the agricultural sector or the tourism sector, and the determination of existing agritourism activities. The questionnaire was organized into the following sections (Appendix A): (a) general profile of accommodation or farmers' operations, (b) agricultural activity, (c) food products suppliers, (d) sale of local products, (e) restaurants, (f) agritourism, (g) partnerships, (h) general profiles, and (i) general opinions (Table A1). The survey was tested, and its completion took an average of 30–60 min (personal interviews) or about 10–20 min (online questionnaire). To test the reliability of the questionnaire, the Cronbach's alpha value was calculated. The Cronbach's alpha for the treated questions was 0.938, indicating very satisfactory levels of internal consistency and reliability for the questionnaire and its dimensions.

2.3. Data Collection

The present research was conducted on 20 municipalities that comprise cross-border regions (the Centro and Alentejo regions of Portugal and Extremadura, an autonomous community of Spain). The required data and information were obtained from surveys and personal interviews. Data collection began in February 2020. However, limitations imposed by the COVID-19 pandemic limited the face-to-face data collection. Personal interviews were retaken from January 2021 to June 2022. The target group for this research comprised the owners of accommodation and local farmers. Accommodation households were randomly chosen regardless of their category and according to their type: rural

accommodation types, specifically "countryside houses", "agritourism", "rural hotels", according to the Decree-law n. º 80/2017 of 30 June; "local accommodation", according to the Decree-law n. º 62/2018 of 22 August, which is in force in Portugal; and "rural hotels" and "rural accommodations", according to the Decree n. º 65/2015 of 14 April, in force in Extremadura.

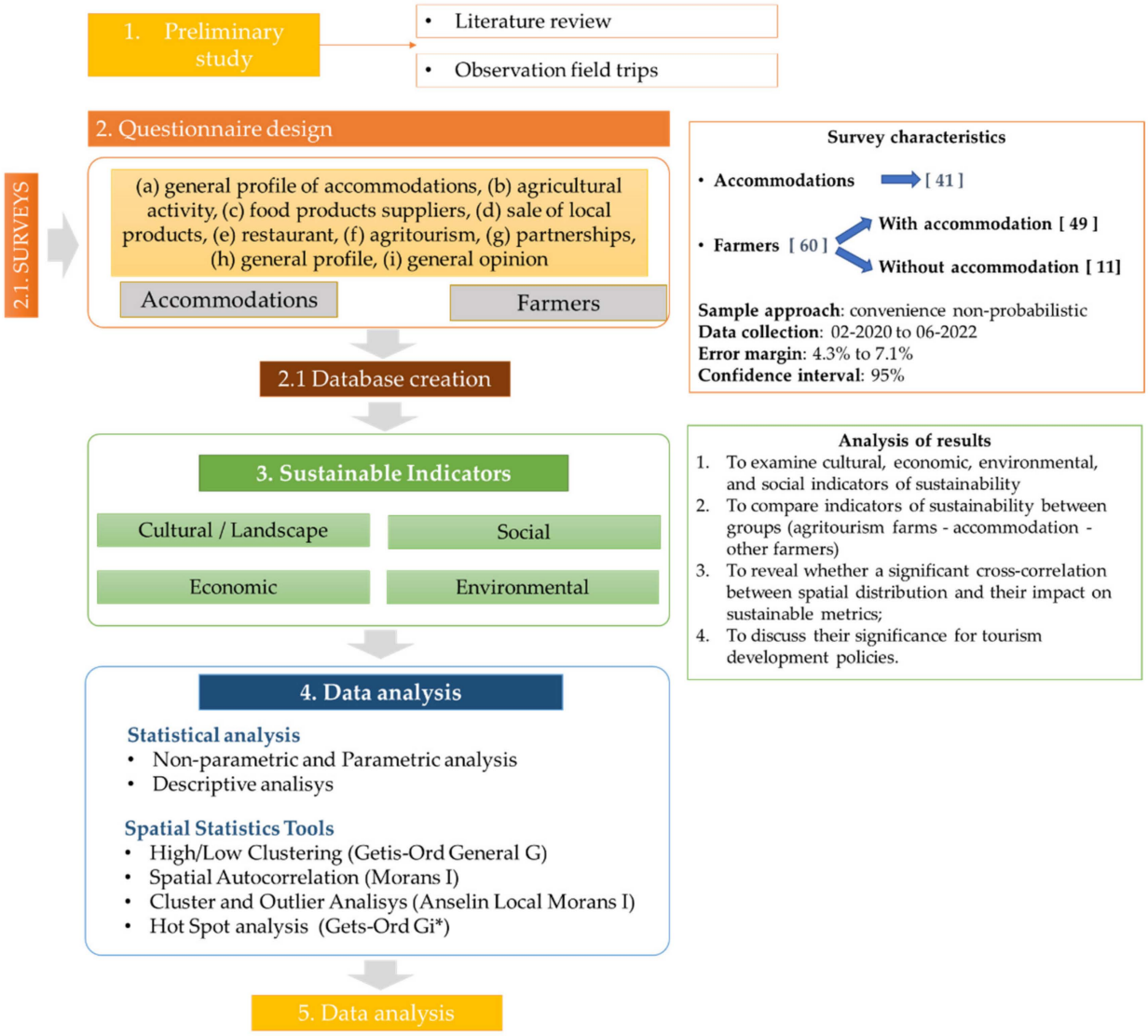


Figure 1. Methodological process.

To identify the accommodation in the study area, the data used were obtained from the Statistical Tourism Office of Portugal (last updated on 31 December 2021) [34], and the Extremadura Tourism official website, which is run by the regional government (last updated on 31 December 2021) [35].

These databases comprise 251 cases. However, after verifying their existence and their availability to collaborate in this investigation, the sample comprised 168 accommodations, of which 82% are in Portugal.

There is no official database that identifies and characterizes farmers. Given this limitation, we used a snowball survey method. The farmers who were part of the study sample were identified by the accommodation managers. Thus, the research includes farmers with whom the tourism sector maintains ties, whether for the supply of products, or to carry out agritourism activities in partnership. The process was repeated until

the sample was saturated and no new contacts were mentioned by the accommodation managers. In this case, this research excludes farmers without ties to the tourism sector.

2.4. Sampling

For research purposes, about 90 personal interviews and surveys with accommodation managers were collected and processed from the field, covering 54% of the total amount of accommodation in the study area. The data collection process allowed for the identification of about 49 cases that also engaged in agricultural activities, which are designated as "accommodations with agriculture activity" (or farming).

The number of surveys proved to be sufficient to determine the effectiveness of the proposed methodology, considering that the margin of error with 95% confidence in the most unfavorable case was 7.1%, while that in the most favorable case was 4.3%.

Due to the limitations of identifying other farmers in the study area, about 11 farmers were interviewed according to the method described above. These are inspiring cases, as they represent examples of links between agriculture and tourism.

Profile of Respondents

For a better delimitation of the database, the cases were organized as follow: accommodation (N = 41), accommodation with agricultural activity (N = 49), and farmers (with links to the tourism sector) (N = 11). Table 2 shows the sociodemographic characteristics of the sample with the main variables: gender, age, level of education, study level, duration of previous experience, and the time spent in business were recorded. About 61% of the participants were male and 39% were female. The average age of the participants was 50 years old (Sta. Dev. 10). Most participants studied to a high-school education level (74%); however, only 12% had qualifications related to tourism and 11% had qualifications related to agriculture. We focused only on those farmers who worked full-time managing their business, while the other profiles were only partially dedicated to this work.

Table 2. Profile of respondents.

Sociodemographic Variables		**Accommodations** ***n*** **= 41**	**Accommodations with Agricultural Activity** ***n*** **= 49**	**Farmers** ***n*** **= 11**	**Total**	**%**
Gender	Male	27 (66%)	26 (53%)	9 (82%)	62	62
	Female	14 (34%)	23 (47%)	2 (18%)	39	39
Age	25–29	2 (5%)	0 (0%)	0 (0%)	2	2
	30–34	2 (5%)	2 (4%)	0 (0%)	4	4
	35–39	7(17%)	3 (6%)	1 (9%)	11	11
	40–44	5 (12%)	2 (4%)	3 (27%)	10	10
	45–49	4 (10%)	10 (20%)	3 (27%)	17	17
	50–54	8 (20%)	8 (16%)	0 (0%)	16	16
	55–59	3 (7%)	14 (29%)	3 (27%)	20	20
	60–64	7 (17%)	6 (12%)	0 (0%)	13	13
	≥65	3 (7%)	4 (8%)	1 (9%)	8	8
Study level	Elementary school	3 (7%)	4 (8%)	0 (0%)	7	7
	Middle school	7 (17%)	10 (20%)	3 (27%)	20	20
	High school or above	31 (76%)	35 (71%)	8 (73%)	74	74
Tourism-related qualifications		7 (17%)	4 (8%)	1 (9%)	12	12
Agriculture-related qualifications		0 (0%)	7 (14%)	4 (36%)	11	11
Time spent in business	Total	3 (7%)	9 (18%)	8 (73%)	20	20
	Partial	38 (93%)	40 (82%)	3 (27%)	81	80
Experience in business (n° of years)	0–3	14 (34%)	14 (29%)	5 (45%)	33	33
	4–9	15 (37%)	22 (45%)	3 (27%)	40	40
	10–20	10 (24%)	10 (20%)	2 (18%)	22	22
	>20	2 (5%)	3 (6%)	1 (9%)	6	6

2.5. Data Analisys

To fulfil the objective of comparing indicators of sustainability between groups (lodgings, farmers, and accommodations with farming), we applied different methods:

- Cross-tabulations by Pearson Chi-square testing (significance level $\alpha = 0.05$) to dummy variables. The value of the Chi-square statistic indicates whether or not there exists a statistical relationship between variables in the cross-classification table [36–38].

U-Mann–Whitney testing (significance level $\alpha = 0.05$), which does not require the assumption of the normal distribution of the data [39].

In second phase, to reveal whether there was a significant cross-correlation between spatial distribution and its impact on sustainability metrics, Hot Spot Analysis (Getis–Ord general G*) and Cluster and Outlier Analysis (Anselin Local Morans I) were applied, according to the procedure detailed in Appendix B [40]. To achieve this, we used ArcGIS software (version 10.8).

The Geographic Information System (GIS) can support touristic activity management, enabling the mapping and analysis of territorial phenomena, such as patterns of accommodation distribution [41]. Understanding the impacts of tourist activity is a fundamental premise of the principles of sustainable development; therefore, the present investigation uses GIS to understand which sustainability patterns emerge in the cross-border landscape. These methods were tested in the literature, highlighting studies with the following aims:

- to examine the drivers of agritourism clusters to try to understand what place-based features are associated with their creation [42];
- to determine hotspots of agritourism and direct sales to consumers in the United States [43];
- to create an indicator of the localization intensity of agritourism farms and explore their spatial distribution at the municipality level [44]; and
- to determine the online reputations of rural accommodation establishments located in the Autonomous Region of Extremadura by means of an analysis of the opinions recorded by rural tourists on various web portals [45].

All studies suggest that the application of geostatistical techniques has numerous advantages due to the spatial distribution of the variables analyzed.

To fulfil our research objectives, it was crucial to determine the spatial distribution and location patterns of the sustainability of agritourism activities [46]. According to the literature, it is possible to use techniques that describe spatial distribution, particularly atypical locations (Outliers), and clusters (Clusters) or hot spots (hotspots), and other forms of spatial heterogeneity [47]. According to the literature, the main spatial effects highlighted include [46,48] autocorrelation (random pattern of distribution) and spatial dependence, which can be positive (when the presence of a given phenomenon in a region extends to other nearby regions, suggesting the "contagion" effect) or negative (when nearby destinations present different values of a variable. In this case, it occurs when a region prevents or hinders the appearance of the same phenomenon in another region, suggesting the "absorption" effect). The autocorrelation can be approached in two ways:

- Global perspective: by identifying trends or spatial structures in each geographic area, following the algorithms of Moran [49] and Getis and Ord [50].

Local perspective: calculating an indicator for each of the observation units, allowing us to identify which of them have higher (or lower) values than expected in a homogeneous distribution. The most commonly used indicators are those proposed by Anselin [51] and Gi* by Getis and Ord [50] and Ord and Getis [52]. Both tests can be considered complementary, as they allow for the detection of territorial patterns of a variable distribution and, simultaneously, help to detect anomalies [41]. However, this approach can be differentiated: while the Hot Spot analysis (Getis–Ord Gi* test) locates clusters of high or low values, the case of the LISA test expands these results to locate not only these two types of clusters, but also other entities with anomalous values compared to the values of neighboring points. In this specific case, the first test aims to locate cases that have the

application of sustainability indicators in common, as shown by the analysis of economic, environmental, social, and cultural/landscape indicators. In the case of the LISA test, it enables a complementary analysis that indicates places where sustainability patterns that are different from the surrounding area stand out. This test can produce five different results [46]: clusters of high or low values with neighboring locations assuming similar values (HH or LL), clusters of high values surrounded by low values (HL), low-value grouping surrounded by neighbors with high values (LH), and, finally, entities for which no significant relationship can be identified.

Our main hypothesis is that there are weak links between agriculture and tourism, which, in turn, translate into weakened sustainability standards. If this hypothesis is confirmed, the main contribution of the present investigation involves the creation of knowledge that aims to support more sustainable tourism management policies and lead to the creation of tourist resources that value local assets and promote the protection of the agriculture landscapes. This principle is based on the objective of delimiting areas where sustainability standards are confirmed and others where, on the contrary, the need persists to develop new measures that are conducive to the development of sustainable tourism. For this purpose, two geostatistical techniques are applied: Hot Spot analysis (Getis–Ord Gi*), which aims to establish similarity patterns (high or low values), and cluster and outlier analysis (Anselin Local Moran/s l), which intends to establish patterns of similarity and anomalous values in neighborhood relations.

For this purpose, we used the Mapping Clusters tool, which is available in the Spatial Statistics Tools package in ArcGIS. It should be noted that, according to the literature, a Hot Spot that reaches a high value becomes relevant from the point of view of sustainability analysis, but it cannot be assumed that it is a statistically significant case, particularly if it appears in isolation [43]. For it to be considered statistically significant, it must have a high value and be surrounded by other points that also have high values. In the case of cluster and outlier analysis, it identifies patches that have high or low values in line with their surroundings, as well as anomalous areas where a patch has a different value from its neighbors, either much higher or lower. There are also cases where it is not possible to identify associations. The statistics generated in this analysis predict that a high positive significance value (z-score), between 1.96 and 5%, indicates the presence of clusters of high or low values of the variable. In turn, a significant negative value (less than −1.96 at 5% significance) indicates the existence of spatial outliers [46].

These techniques produce different results. However, this will allow us to determine which is the technique that best represents clusters with sustainability standards. Therefore, the same distance criteria were used to determine the spatial relationships. The three most common spatial relationships in the literature [41] are: (a) the inverse distance (which is based on the premise that the further away an element is, the smaller the impact itcauses); (b) the inverse squared distance (which only differs from the previous relationship because the slope is more accentuated; in this case, the neighboring influences decrease more quickly); and (c) the fixed-distance range (where neighboring features within a defined influence distance are weighted equally (1, in this case), while features outside the specified distance do not influence the calculations because their weights are equal to zero). This last criterion is the most commonly used in the literature [41,46]. Regarding the possibility of applying these techniques to the case of the tourism sector, the distance factor between neighbors is highly relevant due to the intended contagion effect. The high levels of diversity of the distance criteria led to multiple previous analyses that implied the application of different tests for all spatial relationships. The fixed-distance criterion (Fixed-Distance Band) using the Euclidean method was selected due to the fact that it is the most commonly used criterion in the literature [41,46]. For this purpose, the criterion of 10 km was applied (Figure 1), which allowed us to consider 96% of the analyzed cases; that is, only 4% of the analyzed cases lack neighbors. It should therefore be emphasized that only four cases are omitted in the analysis performed.

2.6. Sustainable Indicators

To measure the economic, environmental, social, and cultural impact resulting from these links, several variables were tested.

Based on the literature review, tourism sustainability may be assessed in terms of human activities and their environmental impact [53]. To make this assessment, Choi and Sirakaya (2006) [17] used six dimensions: economic, social, cultural, ecological, political, and technological. Meanwhile, Roberts and Tribe (2015) [54] used the economic, environmental, and social-cultural dimensions to measure the sustainable development of tourism activity. This research thus identified four dimensions of sustainable tourism indicators: economic, environmental, social, and cultural and landscape. All of these dimensions include variables with quantitative (discrete) or qualitative information (dummy) (Table 2).

The "cultural and landscape dimension" includes six variables that characterize the local way of life and emphasize the importance of the landscape as a cultural and natural resource; according to the literature, this resource is important for promoting recreational experiences [53]. In this case, it enables us to evaluate whether the tourism sector capitalizes on agricultural heritage and local products, and whether tourism operators take advantage of local identities and the agricultural landscape [26]. To measure this variable, we evaluated the presence of several resources that are calculated with different weights according their importance in defining the cultural landscape [55–57]. When developing this perspective, it was specified that "cultural landscape often reflect specific techniques of sustainable land-use, considering the characteristics and limits of the natural environment they are established in, and a specific spiritual relation to nature. (. . .) the continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The protection of traditional cultural landscapes is therefore helpful in maintaining biological diversity" [58]:14. According this definition, which is the most comprehensive description of cultural heritage and the recent incorporation of the landscape, the environment, the territory as a whole, and the active role of the society that inhabits it, it is crucial to preserve cultural and natural values [59,60]. For this reason, we incorporated the landscape dimension while considering the various elements that tell the story of rural life and agricultural traditions, assigning different weights depending on their ancestry and territorial characteristics (Equation (1)).

$$\begin{aligned} &\textit{Visual quality of the landscape} \\ &= \{(\textit{oil mills} + \textit{wine house} + \textit{distillery} + \textit{cheese factory} + \textit{shale architecture} \\ &+\textit{granite architecture} + \textit{stone walls} + \textit{terraces} + \textit{river warf or rivers o} + \textit{wood oven} \\ &+\textit{greenhouses} + \textit{trakings} + \textit{water or wind mills} + \textit{close to historic village}\ /1) \\ &+((\text{mediterranean forest} + \text{vinyard} + \text{ centenary olive trees} + \text{ apiary } + \text{ orchard} \\ &+ \text{vegetable garden } + \text{ animals on pastures} + \text{ pastures } + \text{ traditional olive grove} \\ &+\text{“dehesa/montado” } + \text{ chestnut tree } /0.75) + (\text{endogenous plants or animal races } + \text{ wildlife} \\ &+ \text{forest } + \text{ water reservoirs } / \text{ 0.5})\} \end{aligned} \quad (1)$$

Equation (1). Formula for calculating the variable visual quality of the landscape.

The economic dimension includes eight variables that aim to evaluate the performance of the accommodation and farmers' management practices according to criteria related to their capacity to establish partnerships [61,62] and whether they take advantage of quality products or services [63], as well their impact on job creation or activities diversification [17]. This perspective contributes to our understanding of whether there is an equitable distribution of economic benefits between tourism and the agriculture sector, and whether the same benefits are conferred to local communities [61].

The environmental dimension includes nine variables; the relevance of most of these variables is supported by the literature. This dimension characterizes the ecological profile and the benefits of links between agriculture and tourism. This information is important for verifying whether all businesses show adherence to sustainable tourism policies [54]. This dimension includes variables such as sustainable certification [64–66], whether business take advantage of autochthonous resources [67], natural resources, and renewable energy

sources [54,68], and whether they put into practice measures to prevent natural hazards [17] and contribute to biodiversity conservation [55].

Finally, the social dimension includes seven variables. This dimension explains whether agritourism is considered a solution to developing new and innovative touristic products [9,27,30,69], mainly in relation to local knowledge and activities with impacts on local inhabitants [17] and social farming [70].

In total, 30 sustainable tourism variables were tested to verify whether the relationships between agriculture and tourism are fruitful, as illustrated in Table 3.

Table 3. Sustainable dimension and variables.

Indicator	Objective	Variable	Typology
Cultural/ Landscape	Valuing the aesthetic qualities of cultural heritage	Visual quality of the landscape	Quantitative
		Localization in historic villages	Dummy
		Monuments and historic heritage	Dummy
		Valuing of traditional architecture	Dummy
		Valuing of natural heritage	Dummy
		Valuing of cultural heritage	Dummy
Economy	Valuing invisible economic impacts	Direct sales / personal sales	Dummy
		Online sales	Dummy
		Employment growth	Quantitative
		Economic activity diversification	Quantitative
		Partnerships with tourism sector	Quantitative
		Partnerships with farmers	Quantitative
		Origin certification (PDO/PGI)	Dummy
		Quality certification	Quantitative
Environmental	Valuing the preservation of nature and biodiversity	Renewable energy sources	Dummy
		Organic certification	Dummy
		Localization in natural or protected areas	Dummy
		Autochthonous plant and animal species	Dummy
		Ecosystem services	Dummy
		Prevention of natural hazards	Quantitative
		Education in sustainability culture	Dummy
		Biodiversity conservation	Quantitative
		Circular economy measures	Quantitative
Society	Valuing activities and immaterial heritage	Tourism services (accommodation)	Dummy
		Tourism services (entertainment)	Dummy
		Valuing traditional knowledge	Dummy
		Rural festival organization/participation	Dummy
		Agritourism activities	Quantitative
		Communication of agritourism activities	Dummy
		Social agriculture	Dummy

2.7. The Context of the Case Study

The present study comprises about 20 municipalities in NUT II of Extremadura (Spain), NUT II of Centro (Portugal), and NUT II of Alentejo (Portugal) (Figure 2). The local tourist management in this area is an authentic "patchwork", comprising projects and initiatives led by municipalities or different judicial districts, such as "Mancomunidad de Sierra de San Pedro", Mancomunidad Tajo-Salor", "Mancomunidad Rivera de Fresnedosa", and Mancomunidad de Sierra de Gata" in the Spanish area, and "Turismo da Região Centro" and "Turismo da Região Alentejo" in Portugal. This creates a complex reality, as is reflected by the existence of numerous local initiatives and projects, sometimes without common objectives and lacking clear aims to take advantage of the local resources and local culture of the border territories. Added to this reality the total absence of a strategy to promote agritourism in the territory's tourism agendas, which ignore the landscape heritage, the value of local products, and traditional knowledge as means of promoting a sector based on

the principle of sustainability [71,72]. Only the tourism strategy of the Centro region shows some signs of promoting agritourism, when suggesting the "wool route" and "cheese route" [73], thus recognizing the quality and specificity of agricultural products.

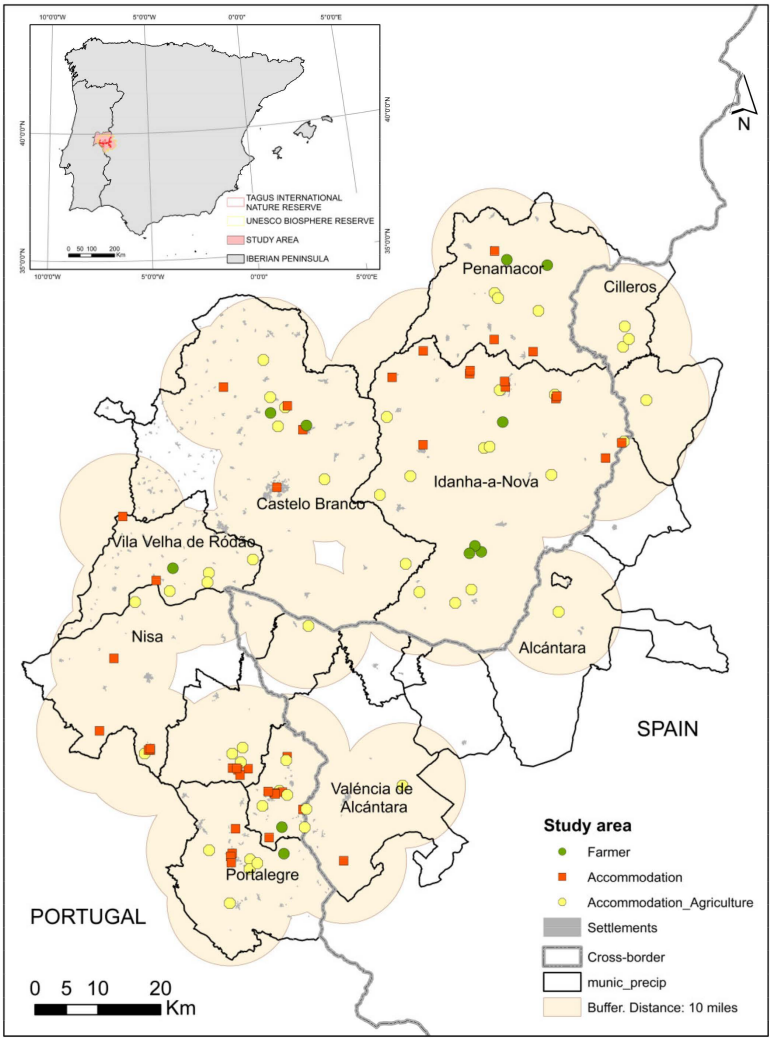


Figure 2. Study area and cases study localization.

In the study area, according to the national statistics of Tourism of Portugal [34] and the Tourism Observatory of Extremadura [35], there are 202 accommodation structures with 1010 accommodation places in 2021, centered in the areas of Castelo Branco city, Portalegre, and close to the historic villages in Idanha-a-Nova, Marvão, and Castelo de Vide. Only 11% of accommodation located in Portuguese territory is classified as agrotourism, according to the decree law n. º 80/2017 of 30 June (which constitutes the common diploma of all tourist enterprises).

Isolation and weak accessibility contribute to low economic dynamism and low investment in public policies. The human geography of this territory is marked by a low rate of occupation, an aging population, and progressive de-population [38]. However, the study area includes border municipalities that are part of the Tagus/Tajo International Transboundary Biosphere Reserve, classified by UNESCO, with some overlapping areas of the Natura 2000 reserve and protected landscape areas, such as the Malcata, São Mamede, Gardunha, and São Pedro. Unique landscapes and quality products can be found in this territory, which is characterized by the predominance of the agro–silvo–pastoral system (designated as "Dehesa" in Spanish territories and "Montado" in Portugal), traditional olive groves that preserve native cultivars (e.g., *Olea europaea* L. "*Galega*" in Portugal and

"*Manzanilla-Cacereña*" in Spain), and animal species such as sheep (*Ovis aries*, var. "Merino da Beira Baixa") and goats (*Capra aegagrus hircus*, var. "Serpentina"). These resources give rise to a great diversity of quality products, such as cheese, pig meet, olive oil, and fresh fruits (chestnut, cherries, and apples) with Products with Denomination of Origin (PDO) or Protected Geographical Indication (IGP) or other thematic branding seals.

For example, in the study area, it is possible to find a variety of new and innovative products that make use of quality brands, such as the seal of "organic farming", "Beira Baixa—lands of excellence" or "International Tagus—gastronomic destiny". These brands are important communication elements, reinforcing the products' origins.

Although there is no structured tourism offer, there are indications of the offer of agritourism activities and services, such as: accommodation on farms, olive picking, oil mill visits, olive oil tasting, bird watching, and educational activities in the "dehesa/montado" (Table 4).

Table 4. Examples of agritourism activities found in the study area.

Activities	Descriptions of Some Examples
Experiences	"Olive oil route with 3 days of experiences", "Picnic in olive grove", "Photo tours in dehesa/montado", "Rural day"
Accomodation on arms	"Herdade da Urgueira"; "Herdade da Sarvinda"; "Herdade da Tapada da Tojeira"; "Almojanda 3 olive tree"; "Olivoturismo Casa Mestre do Lagar", "Casa da Urra", "Finca la Ramallosa",
Learning about agriculture and animal husbandry	"Quinta dos Ribeiros", "Monte do Pego", "Quinta de São Pedo de Vir a Corça"
Olive oil tasting	"Herdade da Tapada da Tojeira"; "Azeite Castelo de Marvão"; "Real Idanha"
Visiting oil mills	"Herdade da Tapada da Tojeira", "Olive oil mills musuem in Vila Velha de Rodão", "Olive oil mills musuem in Idanha-a-Nova",
Olive picking	Beir'Aja; "Real Idanha"
Feeding animals, sheep milking, artisan cheese	"Herdade da Bezágueda", "Beir'Aja", "Alojamento Casa 25",
Bird watching (dehesa)	"El millaron", "Herdade da Sarvinda"
Stargazing (dehesa)	"Casa Rural Montanío Blanco",
Educational activities	"Beira'Aja", "Herdade da Bezágueda"

Source: authors' own data collection instruments.

3. Results

3.1. Agritourism Sustainability Patterns and Dynamics

The main results reveal the importance of social, cultural, and landscape resources in promoting tourism in the study area; additionally, farms' entrepreneurial diversification is suggested because of its numerous benefits (Figure 3). The cultural/landscape dimension is most visible in the cases studied (40%), followed by the social dimension (26%), the economic dimension (20%), and the environmental dimension (14%).

In general, accommodation with agricultural activities has a more sustainable performance, with 61% of total sustainable actions detected, while the accommodations have 21% and farmers implement about 18% of the total.

When analyzing our results in more detail, we noticed that the accommodation with agriculture stands out in terms of the environmental indicators (67%), followed by the social dimension (63%), the cultural/landscape dimension (60%), and the economic dimensions (57%). In the case of accommodation, the cultural/landscape dimension stands out as being the most representative (28%), followed by the economic (19%), social (18%), and environmental (just 10%) dimensions. The opposite scenario can be seen in farmers, who have greater visibility in the environmental dimension (24%), followed by the social (24%), economic (23%) and cultural dimensions (12%).

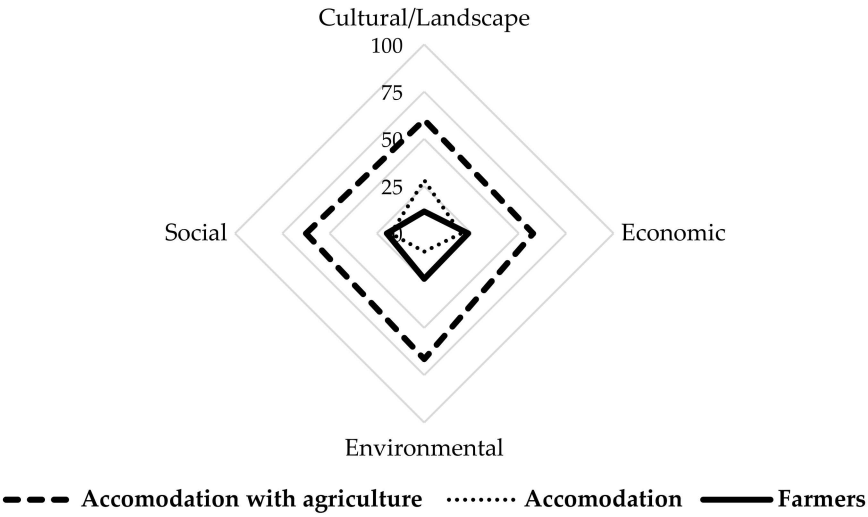


Figure 3. A comparison of sustainable indicators between accommodation, accommodation with agricultural activity, and farmers (% of total implemented actions).

When comparing the accommodation, the worst performance was identified for the economic dimension (Figure 4). This reveals the potential of agritourism to preserve social and cultural values as well important aspects of environmental heritage. This result confirms the urgency of obtaining benefits from sustainable tourism.

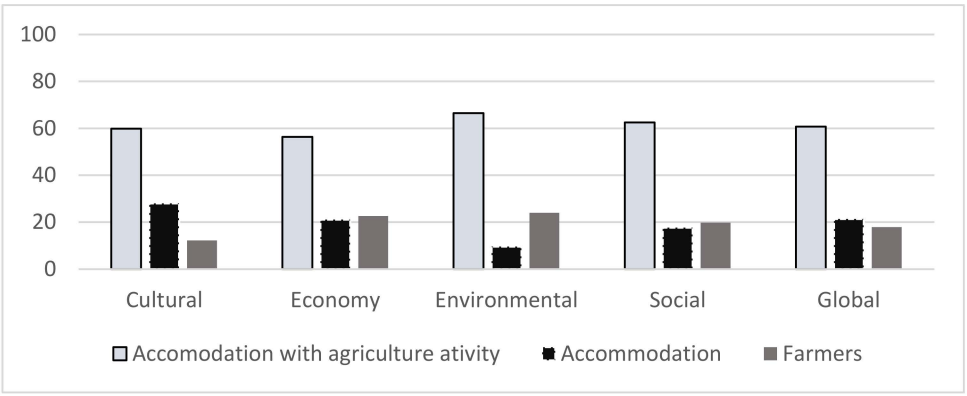


Figure 4. Main impacts of tourism and farming activities (%).

Despite the reduced number of farmers surveyed, we noted that there is a perception that, when there is a connection to tourism, there is a greater contribution to sustainability. On the contrary, accommodation management has lower levels of sustainability performance when it is disconnected from a strategy that incorporates the dimensions of agritourism, local products, or traditions (Figure 4).

The geographic distribution of the results obtained by each typology of sustainability indicator can be seen in Figure S1 in the Supplementary Material. The sustainability indicators, which include the cultural perspective and landscape valorization, generate important benefits, especially to business models that combine agriculture and tourism (i.e., accommodation with agricultural activities, as well farmers with links to agriculture). Overall, accommodation or other tourism services with links to farming seem to be attached to agriculture and, consequently, the landscape is particularly strategically well placed to develop new agriproducts and services for the tourism sector. The distribution of the visual landscape quality variable differed significantly for farmers and accommodation related to farmers: farmers (Mann–Whitney U = 1917, $p = 0.000$), accommodation (Mann–Whitney U = 548.50, $p \leq 0.001$), and accommodation with agricultural activities (Mann–Whitney

U = 650.40, p = 0.112). According to this analysis, the null hypothesis is accepted when p-value are >0.05.

The locations that are close to sites of cultural and historic heritage seem to be particularly important to accommodation (58%; p = 0.026 **); meanwhile, for the accommodation with agricultural aspects, historic villages are strategically beneficial (63%; p = 0.007 **), as is natural heritage (63%; p = 0.001 **). This specificity is particularly important because the study area is an authentic reservoir of natural and cultural heritage related to these natural areas, as well as a site of olive oil, wine, and cork production. These products are symbols that characterize the authenticity of the study area (Table 5).

Table 5. A comparison of cultural and landscape variables between accommodation and other entrepreneurial agritourism models (Chi-square analysis of dummy variables).

Variables	Farmers n = 11		Accommodation with Agricultural Activity n = 49		Accommodation n = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Location in historic villages	4	0.001 **	63	0.007 **	33	0.200
Location close to cultural heritage sites	6	0.080	36	0.250	58	0.026 **
Valuing traditional architecture	5	0.225	52	0.298	42	0.225
Valuing natural heritage	4	<0.001 **	63	0.001 **	33	0.133
Valuing cultural heritage	6	0.475	36	0.278	57	0.261

** Statistically significant (critical value $p < 0.01$).

This study found that farmers with accommodation management or other activities related to the tourism sector were, overall, more successful than those employing other models according to the economic indicators, particularly when analyzing their impact on the quality of products and services (63%; $p \leq 0.001$ ** and 27%; p = 0.019 **) (Table 6), as well as diversification activities (U = 378; p = 0.157 **) (Table 7).

Table 6. A comparison of economic variables between accommodation and other entrepreneurial agritourism models (Chi-square analysis of dummy variables).

Variables	Farmers N = 11		Accommodation with Agricultural Activity N = 49		Accommodation N = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Direct sales	28	0.008 **	68	0.005 **	4	<0.001 **
Online sales	16	0.437	33	0.220	50	0.031 **
Quality origin seal (PDO/PGI)	40	0.405	60	0.002 **	0	<0.006 **
Quality certification	27	0.019 **	63	<0.001 **	0	<0.001 **

** Statistically significant (critical value $p < 0.01$).

Farm diversification is suggested to be undertaken primarily because of its economic benefits and impact on quality (U = 378; p = 0.157 **) (Table 7). In this regard, this investigation found that agritourism, i.e., farming linked with accommodation offerings, appears to be more successful than models offering accommodation alone (U = 497; p = 0.977 **).

Collaborative promotion efforts are crucial to the sustainability of rural tourism. To achieve this, tourism operators, farmers, and accommodation providers should be informed that links between agriculture and tourism add value to tourism offerings.

Globally, all businesses appear to be sensitive to environmental issues associated with agricultural and tourism-related activity. According to Table 8, a relatively large proportion of farmers are engaged in several environmentally friendly farming practices; we highlight

sustainable certification (28%; $p = 0.048$ ** and 71%; $p = 0.003$ **) and the valorization of autonomous species and animal species (20%; $p \leq 0.001$ ** and 80%; $p = 0.005$ **). Sustainable education and renewable energy are most effectively implemented by farmers who provide accommodation (44%; $p \leq 0.001$ **).

Table 7. A comparison of economic variables between accommodation and other entrepreneurial agritourism models (U-Mann–Whitney test of quantitative variables).

Variables	Farmers N = 11		Accommodation with Agriculture Activity N = 49		Accommodation N = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Job creation	8	U = 1490 $p = 0.124$ **	54	U = 497 $p = 0.977$ **	38	U = 1045 $p = 0.185$ **
Entrepreneurial diversification	9	U = 2231 $p \leq 0.001$	65	U = 378 $p = 0.157$ **	26	U = 438 $p \leq 0.001$
Partnerships with tourism	19	U = 1266 $p = 0.968$ **	48	U = 712 $p = 0.012$	33	U = 1049 $p = 0.184$ **
Partnerships with farmers	12	U = 1145 $p = 0.289$ **	43	U = 717 $p = 0.003$	28	U = 1150 $p = 0.495$ **

** Statistically significant (critical value $p < 0.01$).

Table 8. A comparison of environmental variables between accommodation and other entrepreneurial agritourism models (Chi-square analysis of dummy variables).

Variables	Farmers N = 11		Accommodation with Agriculture Activity N = 49		Accommodation N = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Sustainable certification	28	0.048 **	71	0.003 **	0	<0.001 **
Autonomous species or races	20	<0.001 **	80	0.005 **	0	<0.001 **
Renewable energy	22	0.584	55	0.012 **	22	0.044 *
Sustainable education	44	0.846	44	<0.001 **	2	0.059 *
Location in natural areas	7	0.001 **	22	0.007 **	70	0.200

** Statistically significant (critical value $p < 0.01$); * Statistically significant (critical value $p < 0.05$).

The Chi-square test showed that being located in natural areas does not seem to be a problem for farmers; on the contrary, they seem to benefit from the income advantages that support investments in agrifood products and new services in the tourism sector (Table 8). However, relative to other environmental measures, such as the promotion of biodiversity, the implementation of a circular economy, or the prevention of natural hazards, there are no significant differences between groups (Table 9).

These results suggest the importance of recognizing sustainable farming practices and the stewardship effort to improve natural habitats, which is important to valuing natural and agricultural landscapes. Similar results were found by another study, which concluded that these characteristics make a difference to visitors; it also emphasized the need to invest in a communication strategy that foregrounds environmental and social sustainability [30].

Entrepreneurial farming with activities related with tourism also produces several social benefits in the study area (Table 10). Overall, farmers are especially engaged with agritourism and engage in several related activities (69%; $p = 0.012$ **). In addition, the links between agriculture and tourism seems to contribute significantly to the preservation of traditional knowledge, protecting historic buildings, artifacts, and techniques on these farms (66%; $p \leq 0.001$ **). For all these reasons, territorial and tourism stakeholders

should also recognize the additional value that links between agriculture and tourism provide to society.

Table 9. A comparison of environmental variables between accommodation and other entrepreneurial agritourism models (U-Mann–Whitney test).

Variables	Farmers N = 11		Accommodation with Agricultural Activity N = 49		Accommodation N = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Prevention of natural hazards	35	U = 1697 P ≤ 0.001	65	U = 821 P ≤ 0.001	0	U = 499 P ≤ 0.001
Biodiversity measures	25	U = 1637 P = 0.002	75	U = 661 P = 0.021	0	U = 712 P ≤ 0.001
Circular economy measures	38	U = 1538 P = 0.029	62	U = 743 P = 0.001	5	U = 731 P ≤ 0.001

Table 10. A comparison of social variables between accommodation and other entrepreneurial agritourism models (Chi-square analysis of dummy variables).

Variables	Farmers N = 11		Accommodation with Agriculture Activity N = 49		Accommodation N = 41	
	%	Statistical Values	%	Statistical Values	%	Statistical Values
Accommodation services	0	<0.001 *	55	<0.001 **	45	0.002 **
Tourism services	43	0.597	57	0.005 **	0	0.023 *
Agritourism services/activities (marketing)	26	0.377	69	0.012 **	5	0.015 **
Participating in/organizing rural fairs or festivals	66	0.294	33	<0.001 **	0	0.002 *
Valuing traditional knowledge	25	0.008 **	66	<0.001 **	9	<0.001 **
Social agriculture	38	0.002 **	62	0.003 **	0	<0.001 **

** Statistically significant (critical value $p < 0.01$); * Statistically significant (critical value $p < 0.05$).

3.2. Spatial Analisys

The results of the global Moran's I statistic can be interpreted according to Appendix C. As shown in Figure 5, with reference only to the social pillar (d), with a global Moran's statistic I of 0.101491 and a z-score value 2.566699, it can be confirmed at a significance level of 5% that there is a pattern of concentration of variable values in the study area. For the remaining indicators, including the global sustainability indicator, the pattern of the distribution of cases is random. This suggests that the sustainability practices resulting from the relationship between accommodation and agriculture do not follow a pattern of concentration in the territory.

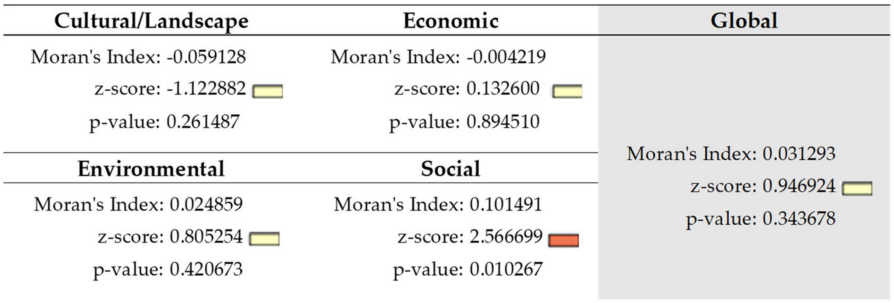


Figure 5. Moran's global I results for the sustainability pillars. Source: authors' own material from calculations carried out using ArcGIS 10.8.

In turn, regarding the Getis–Ord General G (d) test (Figure 6), at a confidence level of 95%, the null hypothesis of the random distribution of sustainability indicators in the study area is rejected. In other words, the results obtained reveal that the patterns of sustainable tourism are randomly distributed in the territory, not following any pattern of concentration or effect of contagion between the evaluated cases. At the same time, it is shown that the relationships between tourism and agriculture have not been established in a fruitful way, since the indicators take into account the presence of the links established between the two sectors.

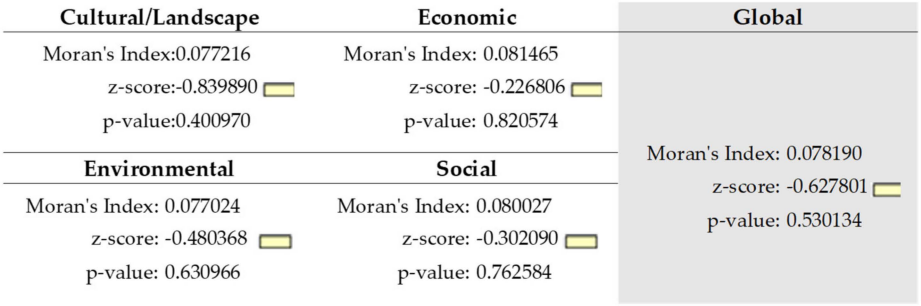


Figure 6. Getis–Ord General G (d) results for the sustainability pillars. Source: authors' own material from calculations carried out using ArcGIS 10.8.

The results indicate a weak relationship between most of the analyzed variables, suggesting that the level of sustainability of the tourism sector is compromised. This result may indicate that local tourism operators, particularly those involved in accommodation management, do not invest in linking tourism with agricultural activity. This scenario indicates that the potential of local products as tourist resources is not properly exploited. This especially relevant as traditional models of agriculture with countless quality products still prevail, but are undervalued.

On the other hand, this analysis only considers the global perspective of each of the evaluated indicators; that is, it considers the whole territory. In fact, as global distribution pattern is not identified, it does not imply the inexistence of accommodation groupings at the local level with different values from the average values of their neighbors. For this reason, the Getis–Ord Gi* test (Hot Spot analysis) was performed. This test reveals the clusters of high values and low values.

As previously mentioned, after several tests, we chose the Fixed-Distance Band criterion, using the Euclidean method; for this purpose, an area of 10 km was applied, which allowed us to consider 96% of the sample.

The results obtained from the hot spot analysis for all evaluated sustainability indicators show some groupings in the study area. It should also be noted that the non-significant cases cover a vast area due to the heterogeneous nature of the sustainability indicators. The lack of statistical significance occurs due to the absence of neighbors, a fact that may hinder the implementation of collaborative networks between tourism and agriculture. However, it should be noted that one of the main difficulties encountered by the tour operators and farmers who participated in this study concerns the intrinsic characteristics of their businesses, particularly the small size and lack of qualified human resources.

According to the Hot Spot analysis, the global sustainability indicator manifested in specific areas that constitute hot spots, as is the case in the northern area. In turn, in the southern zone, cold spots can be identified (Figure 7).

More specifically, the hot spot analysis detected three areas in which cases with different levels of connection between the agricultural sector and tourism (i.e., the accommodation service) are concentrated. Most of the hot spots generated by the analysis correspond to accommodation with agricultural activity or correspond to cases of farmers. This result may indicate that the nearest accommodations do not take advantage of the existence of local production sites to create new products or services that complement the accommodation offer. The same happens with cases corresponding to cold spots. These

constitute, for the most part, accommodation sites with low levels of global sustainability. That is, these are cases in which the variables that measure the links between agriculture and tourism have low scores and, therefore, do not contribute to the sustainability of the tourism sector. Bearing in mind that a considerable part of the accommodation offer is concentrated in the southern zone (Alto Alentejo), this result reveals that these cases are surrounded by neighbors who take advantage of tourism–agriculture links; this is particularly visible in the cases that supply accommodation and agricultural activities, as well as in cases that maintain partnerships with local farmers (Table 11).

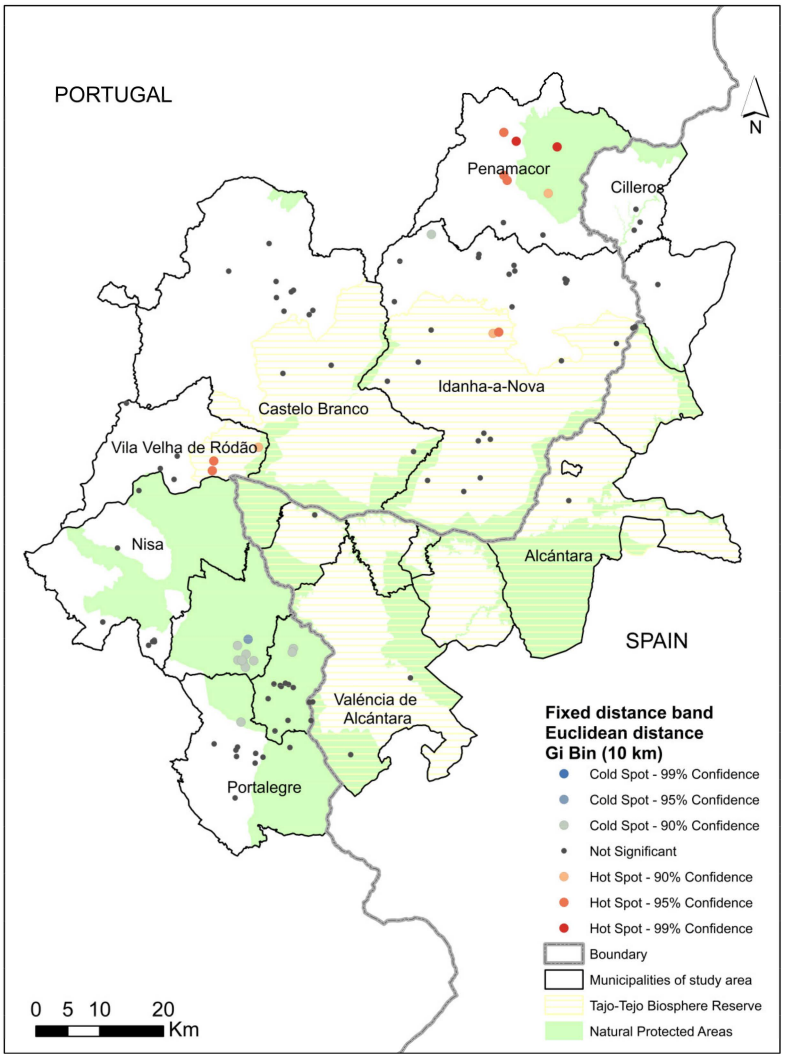


Figure 7. Hot Spot analysis results for global sustainability indicators. Source: authors' own material from calculations carried out using ArcGIS 10.8.

Table 11. Results of the hot spot analysis for global sustainability indicators.

Results	Nº	Area
Hot spot 99% confidence	2	Beira Baixa
Hot spot 95% confidence	6	Beira Baixa
Hot spot 90% confidence	3	Beira Baixa
Not significant	79	Scattered
Cold spot 90% confidence	10	Alto Alentejo
Cold spot 95% confidence	1	Alto Alentejo
Cold spot 99% confidence	0	

Source: authors' own material from calculations carried out using ArcGIS 10.8.

For each sustainability indicator, it is possible observe the overlapping of the same trend for the occurrence of hot spots and cold spots (Figure S2a). However, it is noted that the cultural/landscape indicator stands out in four points, of which three correspond to hot spots with 90% significance, including farmers and accommodation with farmers. The study area is characterized by the presence of traditional olive groves and the dehesa/montado agro–silvo–pastoral system. However, the results offer evidence that this area does not benefit from the specificities of the local culture and landscape by creating tourist products that are specifically aimed at enhancing the agricultural landscape.

The economic indicator (Figure S2b), which includes variables such as sales systems (products/services, either online or physical), jobs generated, economic diversification, partnerships, and quality certification, reveals the existence of three clusters that coincide with the distribution of the global analysis. It should be noted that the hot spots mostly represent farmers and accommodation establishments with agricultural activities, while the cold spots are mostly establishments. In this case, they contrast with cases where links between agriculture and tourism are valued.

In the case of the environmental indicator (Figure S2c), there is a new cluster in the municipality of Idanha-a-Nova, where five new cases appear, most of which are farmers. This result indicates that concerns about environmental sustainability are embraced by farmers, both in their production practices and in valuing native crops and animal species, which are important tourist resources that can aid a local sustainable tourism strategy supported by agricultural activity. This result seems to be in line with the municipality strategy, which integrates the International Network of Eco-Regions, the aim of which is to value organic and quality products. Despite this positive factor, it is noteworthy that most of the cases analyzed in this neighborhood remain disconnected from a strategy focused on the principles of environmental sustainability.

Finally, there is the social indicator (Figure S2d), which includes variables such as the type of existing services, the appreciation of traditional knowledge, social agricultural practices, and the existence and dissemination of agritourism products. The results indicate that, as was found in the previous analyses, the hot spots are mostly represented by farmers or accommodation establishments with agriculture and are surrounded by cases with low levels of social sustainability. In turn, the cold spots, in south of the study area, are mostly represented by accommodations with low sustainability indexes. However, they contrast with their neighbors, which present medium-high values for this indicator. This circumstance contrasts with its potential, as it is an area with numerous natural and cultural resources to attract tourists. This scenario is similar in areas with hot spots where there is a shortage of tourism products supported by a sustainable tourism strategy.

In general, the results suggest that most accommodation establishments overlook the agricultural sector's potential to create more authentic and sustainable tourism products. Thera are some exceptions in some specific areas; some cases emerge where these links seem more solid, manifesting as indicators that point to a pathway towards sustainable local development. It should also be emphasized that the results indicate that accommodation is concentrated in highly specific areas, and, regardless of whether this is a hot or cold spot, the accommodation is surrounded by numerous tourist resources and is integrated in natural areas with protected status and with high heritage value. However, this factor remains absent from any strategy for the promotion of cross-border tourism that combines natural and cultural factors and which takes advantage of local products.

As a result of this situation, it is fundamental that the local stakeholders develop strategies that promote links between the sectors to facilitate the consumption of local products among tourists/visitors, as well as supporting agritourism projects. This strategy, which is centered on valuing the multi-functionality of rural areas and their landscapes, could be a way to reinforce the development of the territory.

Cluster and outlier analysis (Anselin Local Moran's I) was also used to detect clusters and anomalous areas. In other words, this analysis was intended to highlight some aspects

that the Hot Spot analysis may not have covered. For comparative purposes, in this analysis, the same criteria were applied: a fixed-distance band and Euclidian distance of 10 km.

From the global indicator, which measure patterns of sustainability, it immediately becomes clear that there are several areas that overlap with the areas identified in the previous analysis (Figure 8). There are also new areas between which relevant relationships are established; additionally, it is verified that around 84% of the cases do not integrate any cluster. The presence of HH or LL clusters (including eight cases) or HL or LH outliers (including eight cases) is evident in areas where protected natural areas exert some influence, as well as in areas where cultural heritage is rich and diverse, such as in the municipalities of Idanha-a-Nova, Marvão, and Castelo de Vide.

The HH cluster includes 4 cases with 146 points in the global sustainability indicator, which contrasts with the LL cluster, which has only 15 points. This implies that, for the first case, the area corresponds to cases with an offer of tourist products where the links between agriculture and tourism are more visible; meanwhile, the second situation refers to tourism offers supplied exclusively by the accommodation services, without taking advantage of the links with the agri-food sector. In the case of the HL cluster, it indicates that the two business models coexist (tourism and agriculture), in this case with an average score of the global indicator of 11. However, they are surrounded by cases with a low sustainability index, in this case represented by the category of accommodation. In turn, the LH cluster indicates the coexistence of accommodation establishments cases with a low sustainability index (around 45 points) mixed with other cases that are precisely the opposite; in this situation, they are represented mostly by farmers.

In general, this analysis corroborates previous analyses, which suggest the weak capacity of the territorial administration to generate tourism products based on the potential of endogenous resources, enabling the private sector to create its own dynamics, sometimes without a global vision. Regarding the potential of this frontier territory, identifying key sectors such as agri-food production boosts the creation of agritourism products.

When we analyze the indicator corresponding to the cultural and landscape variables, the cluster and outlier analysis suggests that only three LH points indicate the coexistence of cases that benefit from cultural and landscape aspects as a tourist resource, whether in the creation of agrotourism products or in the promotion of the businesses linked to the territory. There are also three HL points that indicate the presence of cases that value local cultural and landscape aspects but are surrounded by cases that ignore them in their development strategies. It should be noted that accommodation with agriculture stands out as having the highest scores for the cultural/landscape sustainability indicator (Figure S3a).

For the economic sustainability indicator, an LL cluster stands out in the southern region of the study area, which indicates the presence of cases with low economic sustainability indicator values. In this case, it reflects the prevalence of business models focused only on accommodation management, without strategic partnerships and without quality certification. The LH cases, on the other hand, reflect situations with low values that are surrounded by cases of high economic performance. In this case, the presence of farmers and accommodation with agricultural activity stands out within the surrounding area, suggesting the existence of partnerships with the agri-food sector and its important role in the sustainability of the business. Finally, the HH case is surrounded by cases with high values; that is, accommodation with diversified activities, strategic partnerships (primarily with farmers), and an innovative sales system and appreciation for quality products, whether these are of the place's own production, as is the case for olive oil and cheese, or derived from the connections established with local production sites. These indicate the potential for the creation of more authentic tourist products (Figure S3b).

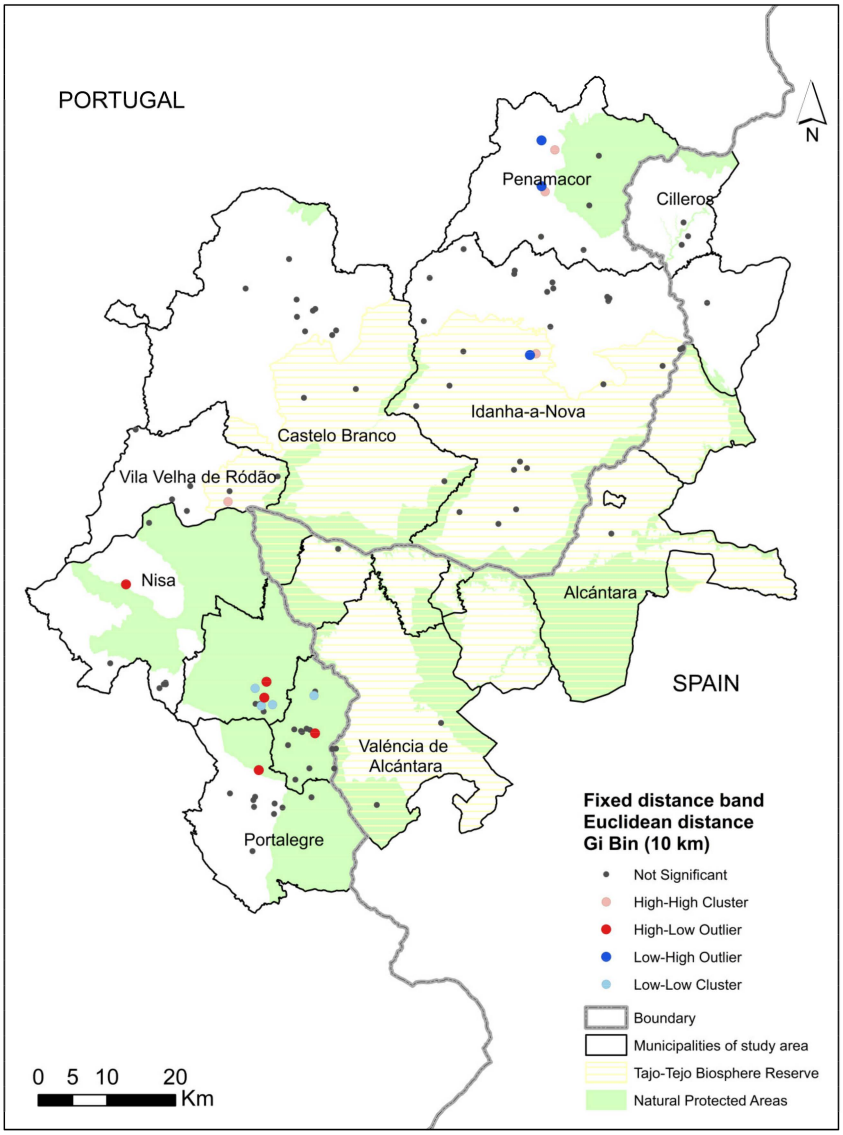


Figure 8. The results of the cluster and outlier analysis of global sustainability indicators. Source: authors' own material from calculations carried out with ArcGis 10.8.

In the case of the environmental sustainability indicator, it is important to highlight the role of agricultural activity as a vehicle for promoting sustainability. That is, it appears that farmers are the ones who represent the highest values, maintaining the trend around them. This indicator highlights the weight of the following variables: the "prevention of natural risks" and the implementation of "circular economy measures". This result gives us clues about the role of the farmer in preserving the landscape and protecting biodiversity. It should also be noted that most of the cases studied are in the vicinity of important natural protection areas. Considering this area's tourist potential, special tourist policies are needed to allow for the sustainable exploitation of resources. In this context, it is important to value food production practices that rely on extensive and traditional models, as well as the promotion of traditional products and the protection of endogenous cultures and breeds (Figure S3c).

Finally, the analysis of the social sustainability indicator shows us a cluster of low values (LL), revealing the existence of cases that do not value the links between agriculture and tourism, as well as showing contempt for traditional knowledge as a basic resource for creating diverse tourism products that are anchored to local traditions. In turn, the HH

points are the ones with the highest scores in this indicator, which means that they value agriculture and agri-food products in their business strategies (Figure S3d).

4. Discussion

This study confirms that only 16% of tourism operators are capable of adjusting their business practices to meet current challenges; those that diversify their business with agricultural activities have the most sustainable performance, as highlighted by their positive impact on environmental indicators. Despite the low participation of farmers (11 cases), similar results were obtained in this part of the study, which highlighted their important contribution to preserving the landscape and cultural heritage as well their positive relationships with the tourism sector. Similar conclusions were obtained by other authors, who confirm that the capacity to incorporate a broad variety of enterprises can enable farmers and touristic operators to respond to new market opportunities and to adapt their business to emerging contexts [74]. However, this study found evidence for the prevalence of tourism management models that ignore the role of agriculture, the importance of local products, and the role of rural traditions in promoting high-quality tourist programs. It is important to note that the prevailing links between tourism and agriculture are informal and do not form part of local development strategies. This implies a total lack of the promotion and diffusion of the agritourism products and services that exist in the study area. Similar results are discussed in the literature, which highlights the need to create tourism products based on the local products and traditional resources of the agricultural landscape [75].

With respect to sustainability indicators, this research confirms the importance of environmental contributions resulting from links between tourism and agriculture, especially in relation to the positive impact of adopting measures to protect nature or other actions that preserve biodiversity, as well preserving and restoring historic buildings and other resources that contribute to the cultural landscape's value. This result concurs with similar cases described in the literature, especially when environmental benefits are found due to agritourism activities that have a positive impact on the protection of natural resources, habitat conservation, and other factors [56,76].

Understanding and managing cultural landscapes involves studying the patterns and dynamics of land-use changes [77]. This study found that showcasing the scenic beauty of the landscapes and placing value on cultural heritage had a positive impact; in this regard, traditional and sustainable agricultural activities are relevant. For this reason, any agricultural model that compromises these principles also compromises the sustainable tourism strategy. In effect, the study area is an authentic reservoir of nature and cultural heritage, where it is possible to find rare natural species as well as monumental works created by humans. Given this situation, the sustainability indicators offer evidence of the role of farmers in preserving natural resources, as well as providing an opportunity to promote innovative products and services; this builds bridges with tourism, as is practiced by accommodation managers who also offer agricultural activities.

For agriculture-based territories, it is easier to develop agritourism initiatives [14]. As such, it is important to adopt a strategy to improve dialogue and partnerships; this strategy should be built on mutual trust and respect between accommodation managers and farmers across the territory. This strategy is important for promoting tourism in cross-border destinations, particularly those situated beyond tourists' preferred areas. Recent studies indicate that demand for rural areas is increasing [78], but this pattern presents different behaviors, seeming to reaffirm the demand for destinations with structured offers [41,46]. Faced with this evidence, territorial and touristic stakeholders must become aware of the need to invest in a cross-border and multisectoral cooperative strategy. On this basis, this study can provide a range of sustainability indicators that will provide a basis for local stakeholders' decisions and enable the development of new situated policies and bottom-up site-specific actions [79].

Another novelty of this study relates to the use of a geostatistical approach, which enriches the obtained results by applying exploratory spatial data analysis, emphasizing the need to visualize spatial distributions and local patterns of spatial autocorrelation. These techniques allow us to identify the spatial distribution patterns of the sustainable variables under consideration, as well enabling us to identify groupings of variables with similar or different behaviors. According to the literature, the main advantages of this methodology derive from the identification of cluster mapping, which allows for the planning and implementation of sustainable development strategies in more extensive territories [46]. This methodology is adopted by several studies [41,45,46], a primary limitation of which concerns the fact that the results obtained should be related to the conceptualization of the neighborhood criterion, which must be adapted for each study area.

In methodological terms, this study is based on the importance of understanding the impact of the links between agriculture and tourism. We focus on elucidating which patterns and dynamics can explain the presence or absence of agritourism offers. As a result, this research provides, on the one hand, exhaustive knowledge of sustainable patterns. On the other hand, this study also confirms the need to identify the most suitable neighborhood criterion, adopting a fixed-distance band with a Euclidean distance, in line with the literature [80,81]; this approach is also applied in different studies [41,46]. In this study, a distance of 10 Km was applied, which ensured the existence of at least one neighbor. This factor is particularly relevant due the methodological procedures that guarantee more robust results [46]. Additionally, in this regard, the study conducted by Van Sandt et al. [42] notes that agritourism is an attractive activity that enhances entrepreneurship and rural innovation; it is significantly boosted by the contagion effect between entrepreneurs in the agricultural and tourism sectors, who influence each other. This observation gains special emphasis given that the applied methodology allowed for the analysis of each case with regard to their neighboring relationships. Based on the analyses carried out here, it was noted that the links between tourism and agriculture are very tenuous.

Regarding the main results obtained from this study, it should be emphasized that this methodology is fully innovative in that it applies sustainability indicator results by analyzing their distribution behaviors in the territory. Globally, we observed a weak tendency towards the concentration of values in the study area. This result indicates that tourism sustainability patterns are randomly distributed, not following any pattern of concentration or contagion effects. However, given that this relationship is not significant according to the Getis–Ord general G (d) and Moran's global I tests, we cannot confirm whether this tendency is the result of the concentration of high or low values of the variable, as is corroborated in the literature [46].

Thus, from a local perspective, we detected the presence of three clusters in the main tourist areas, which were characterized by the concentration of a high number of accommodation establishments. Most of these cases seem to benefit from links with the agricultural sector (especially because they are cases of farmers who provide accommodation services or accommodation managers offering farming activities). However, most of the accommodation establishments do not take advantage of these connections and lose the opportunity to create authentic touristic services and products. Our analysis also highlighted the cases where environmental performance is relevant. This reality was observed by the farmers included in this study, especially due their desire to preserve sustainable and traditional farming practices.

Regarding the Anselin Local Moran's tests, the main results corroborate previous findings. However, we note that 84% of the cases do not include any cluster. Nevertheless, it seems evident that the cases that include clusters take advantage of their locations, particularly in natural areas or in areas close to centers of cultural interest.

To conclude this analysis of the results, the main findings suggest that there is a weak capacity for territorial administration to create tourism products supported by the potential of the endogenous resources; presently overlooked fundamental sectors, such as agricultural activity, can enhance the creation of more authentic agritourism products,

as can cross-border territories with numerous resources and local high-quality products. A territorial representation of the sustainability indicators made it possible to visualize the distribution of sustainability standards and realize that links with the traditional agricultural sector are currently going to waste.

Limitations and Recommendations of the Study

One of the main limitations of this research is related to the sample size, particularly the limited number of farmers. Future research would include more farmers, as well farmers without ties to the tourism sector, in order to explore their motivations, as well their impact on sustainability and their contributions to territorial development. Despite this limitation, this investigation has uncovered links between agriculture and tourism that remain largely invisible. The traces of agritourism discovered remain unstructured and lacking a global strategy for the dissemination of the huge number of agrifood products with quality seals and extensive and sustainable agriculture practices that are found in this territory. Given this limitation, it would be beneficial to conduct an analysis of the sustainability performance of other farmers with and without links with tourism. This perspective would allow us to evaluate whether sustainability patterns would change. This knowledge is important considering that entrepreneurial diversification in rural areas, especially through agritourism, has the potential to compensate for reduced agricultural incomes and to revitalize local communities. Future studies should consider the sustainability of agritourism in relation to nonentrepreneurial farms. Finally, it should be noted that this study placed all of the studied enterprises into a single group to analyze spatial relationships; thus, some forms of entrepreneurial developments may see increases or decreases in some indicators of sustainability. Thus, in future research, it is important to evaluate and compare different business patterns with a more robust sample size.

Despite the identified limitations, this investigation demonstrated that the links between agriculture and tourism make a positive contribution. Our findings support the following political and territorial recommendations:

- Strengthen business models that value local products and rural traditions in tourist programs, particularly in depressed territories.
- Support local initiatives to link tourism and agriculture, communicating existing initiatives in a structured way.
- Value the ecosystem services that result from the links between tourism and agriculture, which are particularly visible in actions that contribute to the preservation of the landscape's cultural value.
- A sustainable development strategy must have consistent intentions and practices. In this regard, support for extensive and sustainable agriculture is recommended, as well as halting intensive production, as observed in the last two years.
- The role of agriculture in the dynamics of tourism should be valued, in terms of its links with agri-food production, traditional knowledge, or the diversification of differentiated tourist services.
- Strengthening supply chain proximity is critical if tourism and agriculture are to mutually benefit from demand from low-density destinations.
- Promoting and supporting local networks between farmers and accommodation managers are crucial to guaranteeing local consumption and encouraging initiatives that promote direct contact with farmers, local products, and local knowledge.
- Building on the last point, the methodology used here revealed the urgent need for collaborative networks between tourism and agriculture, as these would provide the opportunity to develop this destination.

5. Conclusions

This study aimed to examine several indicators to evaluate the economic, social, environmental, and cultural and landscape performance of sustainability among farms and accommodation providers in cross-border regions. The main results showed that

links between agriculture and tourism produce several positive impacts. Although there is highly reduced expression in the territory, these impacts are especially visible in terms of the diversification of activities, job creation, the preservation of high-quality and sustainable agrifood products, as well as other factors that effect communities, such as the valorization of traditional knowledge and natural heritage conservation. These results support the need to recognize the role of the farmers in promoting new and renovated products and services that make important contributions to developing low density territories and building a path towards their sustainability. According to these findings, this study reinforces the need to foster robust links between agriculture and tourism as a means of valorizing the small-scale and sustainable methods of production that agritourism offers. By comparing different business models, this analysis found that tourism offers based only on accommodation performed poorly in sustainability indicators. This suggests that agritourism produces a significant number of economic, social, cultural, and environmental benefits, given that it has been verified that accommodation with agricultural activity has a positive sustainability performance. Meanwhile, it is important to reinforce that, in the study area, the offer of "authentic agritourism" is reduced, but it is possible to conclude that the links between agriculture and tourism have positive impacts for business structures and for society.

Finally, this research highlighted the potential of agritourism activities to develop the studied area, which is marked by the cultural and natural richness found in the cross-border regions between Portugal and Spain; however, gastronomy and local products remain absent from any territorial strategy.

The application of the cluster mapping techniques was efficient in detecting accommodations clusters with similar sustainability performance, which reflect more robust links between agriculture and tourism. This is particularly relevant because reveals a territory without borders that should be promoted in partnerships between Portuguese and Spanish stakeholders.

Overall, the main contribution of this study was detecting the patterns and dynamics of agritourism, as well their potential to develop cross-border territories marked by fragile social and economic dynamics, which urgently need to be addressed. We propose collaborative agritourism programs as a solution to fix these issues and attract young people, new investments, and more conscientious demand trends, especially in relation to traditional and sustainable agriculture (innovative values) and distinctive landscapes (the attractiveness of resources). This analysis may deepen the relationships between agricultural landscapes and enhance their potential to be part of sustainable tourism strategies, in keeping with emerging rurality trends that are marked by the pursuit of the initiatives of rural valorization, sustainable agriculture, and collaborative initiatives.

Supplementary Materials: The following supporting information can be downloaded at: https://www.mdpi.com/article/10.3390/land12040826/s1, Figure S1: Spatial distribution of sustainable pillars of agritourism; Figure S2: Hot spot analysis; Figure S3: LISA analysis.

Author Contributions: Conceptualization, D.I.R.F.; methodology, D.I.R.F.; software, D.I.R.F.; validation, D.I.R.F. and J.-M.S.-M.; formal analysis, D.I.R.F.; research, D.I.R.F.; resources, D.I.R.F.; data preservation, D.I.R.F.; writing—original draft preparation, D.I.R.F.; writing—review and editing, D.I.R.F., J.-M.S.-M., and L.C.L.; visualization, D.I.R.F.; supervision, J.-M.S.-M. and L.C.L.; project administration, D.I.R.F.; fundraising, J.-M.S.-M. All authors have read and agreed to the published version of the manuscript.

Funding: This study is part of the research carried out during the execution of the project "Agritourism in the dehesas of Extremadura: an opportunity to increase agricultural income and population fixation in rural areas"; its code is IB20012. This research was funded by the Ministry of Economy, Science and Digital Agenda of the Regional Government of Extremadura and the ERDF (European Regional Development Fund). Dora I. R. Ferreira was the beneficiary of a nationally funded individual PhD scholarship through the Foundation for Science and Technology (FCT, Portugal) with reference number 2020.05487.BD.

Data Availability Statement: Not applicable.

Acknowledgments: The authors would like to thank the interviewees for the information they provided and express their sincere appreciation to the reviewers.

Conflicts of Interest: The authors declare no conflict of interest. The funders had no role in the design of the study; in the collection, analysis, or interpretation of the data; in the writing of the manuscript; or in the decision to publish the results.

Appendix A

Table A1. Variables collected in the survey to describe the supply of rural lodgings and to identify relationships with the agricultural sector.

Type	Factor	Levels
Section A	General profile of the accommodation	
Main characteristics	Type of accommodation	Only one option: rural hotel; local accommodation; agritourism; rural accommodation; country houses
	Year	Numeric
	Location	Single choice: rural/urban area; small towns; natural areas; agricultural operation
	Elements of the landscape	Multiple answers: olive grove; orchard; vineyard; pasture/montado (agro–silvo–pastoral system)
	Main infrastructure	Multiple answers: stone wall; local varieties; pastures; rural roads and single trails; beehives; traditional oven; mills; gardens; vernacular architecture; other
	No. of beds	Numeric
	Main services/activities	Multiple responses: swimming pool; bicycle; garden; kitchen access; meals on request; breakfast included in price; tour guide; advantages of access to local/regional cultural infrastructures; experience and tour packages
Section B	Agricultural activity	
Main agri-food products	Crops and agricultural products	Descriptive
	Processed products	Descriptive
	Animal husbandry	Descriptive
	Agri-food production system	Multiple answers: rainfed; irrigated; intensive; extensive; traditional; precision
	Natural hazard mitigation and risk reduction measures	Multiple answers: fire prevention; wastewater treatment; soil erosion prevention, other
	Biodiversity promotion measures	Multiple responses: control of invasive species; reforestation of native species; environmental education plan
	Measures to promote the circular economy	Multiple responses: organic waste for animal feed; water/electricity reuse system; other
	Trademarks	Likert: from 1 (low) to 5 (high)
	Main motivations for investing in agriculture	Multiple responses: invest and recover equity; diversify sources of business financing; add value to the lodging business; reduce the environmental impact associated with the production and transportation of food and raw materials; develop the farm-to-table circuit
	Income from activities	Numeric
	Quality certification	Multiple answers: PDO, PGI, organic farming, other
Section C	Supply of food products	
	Own production for self-consumption	Descriptive
	Local supply chains	Descriptive
Section D	Sale of local products	
	Own store	Dummy = 1 if yes; dummy = 0 if no
	Can sell products after the experience	Dummy = 1 if yes; dummy = 0 if no

Table A1. *Cont.*

Type	Factor	Levels
Section E	Restaurant	
	Own restaurant	Dummy = 1 if yes; dummy = 0 if no
	Main courses	Descriptive
	Own products for self-consumption	Descriptive
	Local supply chains	Descriptive
Section F	Agritourism	
	Activities available	Dummy = 1 if yes; dummy = 0 if no
	Intention to offer activities	Dummy = 1 if yes; dummy = 0 if no
	Channels used to promote agritourism	Descriptive
	Price	Numeric
	Associations for the organization of agritourism activities	Descriptive
	Main objective	Multiple responses: general public; local residents; guests; students; other; other
	General opinion: • Do agritourism programs value the experience of tourists visiting this territory? • Tourists/guests are not interested in agritourism activities • Tourists/guests are only looking for accommodation • Tourists/guests are not interested in the rural lifestyle • Tourists/guests are increasingly interested in learning about agriculture and rural traditions • Tourists/guests are not interested in participating in animal activities • Tourists/guests prefer to observe the landscape rather than participate in agricultural activities • Tourists/guests are not interested in traditional products • Tourists/guests who visit rural areas show interest in living here. • Tourists/guests express interest in gastronomic experiences that value local produce • Tourists/guests complain about the lack of cultural activities in rural areas • Tourism in rural areas influences tourists to adopt more sustainable habits • The tourism sector is not interested in agricultural activity. • Farmers are not interested in tourism on their land • It is not possible to reconcile agricultural activities with tourism management activities • I buy directly from other farmers because they maintain the beauty of the landscape • I do not buy local products because the quality–price ratio does not justify this choice • Tourists/guests prefer active tourism or activities in nature to contact with the countryside	Likert: 1—Strongly Disagree, 9—Strongly Agree

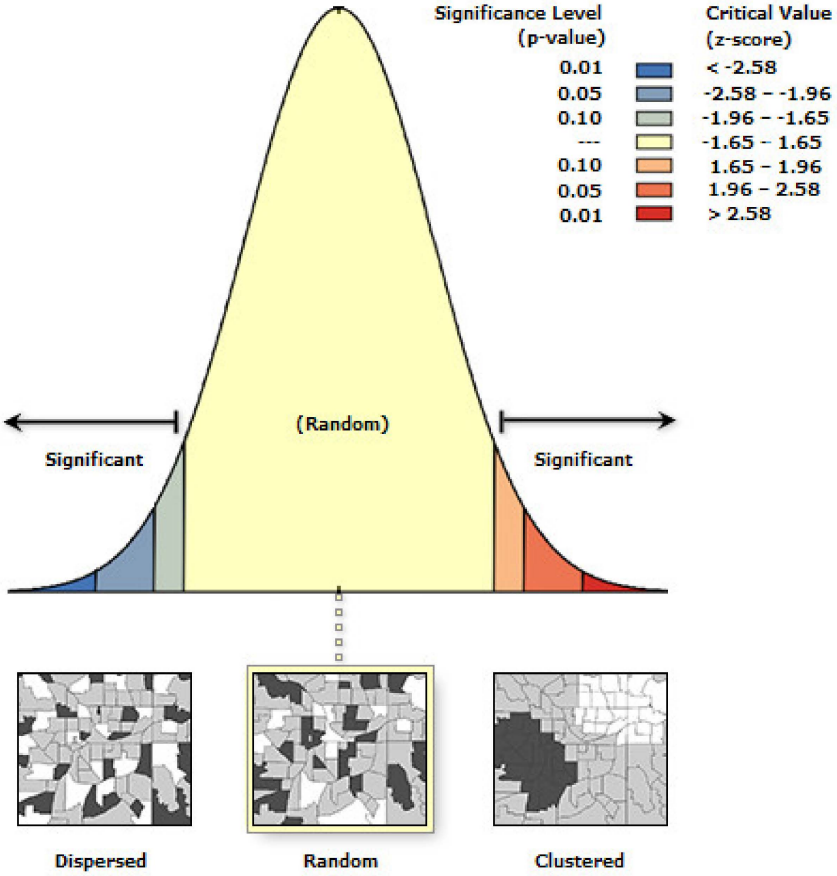
Table A1. *Cont.*

Type	Factor	Levels
	Main tourist attraction	One choice: nature/landscape; quiet/peace; local people; heritage/cultural offering; food/wine; local traditions; welcoming/hospitality
	Advantages of linking agriculture and tourism: • Promotes local supply chains ("from farm to fork") • Reinforces local gastronomic identity • Promotes sustainable production models • Guarantees the best quality–price ratio of the products • Creates more employment opportunities • Attracts tourists who are more environmentally responsible and respectful of rural traditions • Creates more skilled jobs • Promotes access to fresh and seasonal produce • Contributes to the self-esteem of the local population • Values local crops/varieties/breeds • Promotes quality and certification of local origin (PDO/PGI) • Promotes activities and events to raise awareness of the territory • Promotes the recovery and valorization of traditional knowledge • Promotes the recovery of housing and facilities made with sustainable materials and traditional architecture • Contributes to the maintenance of landscapes of cultural interest	Multiple answers (three most important, ordered by relevance)
Section G	Associations	
Partners and objectives	Who are the partners	Multiple answers: farmers; artisans; municipalities; public entities; tour operators; other
	Main objectives	Multiple answers: housing promotion. promoting own agri-food products; organizing tourism activities; organizing experiential programs promoted by the network; organizing educational/environmental awareness programs; selling products to specific markets; participating in competitive trade networks; not applicable to my situation.
	Partnerships with local restaurants	Dummy = 1 if yes; dummy = 0 if no
	Main objectives	Multiple answers: sell products; recommend a reliable service; support local gastronomy; strengthen the local economy; create customized experience packages. Meal delivery at lodging; does not apply to my situation.
Section H	General Profile	
Company and respondent profile	Quality certification	Multiple responses: biosphere; green key; travel and hospitality award; other
	Renewable energy sources	Dummy = 1 if yes; dummy = 0 if no
	Business dimension	Numeric
	No. of jobs	Numeric
	Education	1—Basic studies, 2—Mid-level studies, 3—Graduates
	Gender	Dummy = 1 if male; dummy = 0 if female
	Job	Descriptive
	Age	Numeric
Section I	General opinions	
Strategies for the territory	Strategy to develop the cross-border territory as a tourist destination	Descriptive
	Benefits of proximity to another country/culture	Descriptive

Appendix B. Spatial Statistics Tools

1st phase	Data acquisition: alphanumeric lodgings and farms database; geocoding for cartography; cartography: http://centrodedescargas.cnig.es (accessed on 1 February 2022) https://sigtur.turismodeportugal.pt (accessed on 1 February 2022)
2nd phase	• GIS implementation—ARCGIS Version 10.8
3rd phase	Spatial Statistics Tools
Analyzing Patterns	**Mapping Clusters**
• High/low clustering (Getis–Ord General G) • Spatial autocorrelation (Moran's I)	• Cluster and outlier analysis (Anselin Local Moran's I) • Hot Spot analysis (Getis–Ord's Gi*)
Spatial Relationships	
➢ **FIXED_DISTANCE_BAND**: Each feature is analyzed within the context of neighboring features. Neighboring features inside the specified critical distance (distance band or threshold distance) receive a weight of one and exert influence on computations for the target feature. Neighboring features outside the critical distance receive a weight of zero and have no influence on a target feature's computations.	
Distance Method	
➢ **EUCLIDEAN DISTANCE**: The straight-line distance between two points (as the crow flies).	
4th phase	• Report and discussion of results

Appendix C. Interpretation of Moran's Global I Test and the Getis–Ord General G(d) Test



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