Article

Spatial Analysis of Seasonal and Trend Patterns in Romanian Agritourism Arrivals Using Seasonal-Trend Decomposition Using LOESS

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Abstract: Seasonal variations in the tourism industry consist of alternating patterns of overuse and underuse of touristic potential and resources, which correspond to overexertion in the peak periods and to reduced income levels in the trough periods. We analyze both trend and seasonal components for agritouristic boarding houses, conventional boarding houses, hotels, and overall arrivals in 41 Romanian counties by using the Season-Trend decomposition using the LOESS method previously used in forecasting. Our findings suggest that there is a moderate positive relation between trend and seasonality in agritouristic boarding houses, a situation that is not shared with other types of accommodation units studied. While at a country-wide level the seasonal character of agritourism is not significantly different from other types of accommodations studied, in some counties located in south-east Romania, the seasonality exhibited by agritourism is significantly lower. Agritourism seasonal patterns exhibit spatial correlation features, indicating that underlying natural and anthropic causes exert more influence than in the case of other types of accommodations. These findings may be used to shape public policy and entrepreneur behavior in agritourism and rural tourism, domains where farm income diversification is instrumental to surviving events such as crop failures, price changes, and consumer behavior.

Keywords: tourism seasonality; trend and seasonality in tourism; STL decomposition; seasonality in agritourism; sustainable development; agritourism

1. Introduction and Literature Review

1.1. Introduction and General Notes on the State of Research on Tourism Seasonality

Seasonal variations have been an important and recurring topic of discussion for the hospitality industry, from both a business and a scholarly perspective. Various articles published in the last 50 years deal with measuring seasonality and propose ways to combat some of its more negative effects, such as loss of possible revenue or overexertion of touristic resources during peak season [1–3].

However, compared to other subtypes of tourism, or tourism in general, the analysis of seasonality in agritourism received relatively little scholarly attention, a situation which can be viewed as a major gap in the research literature, given the current development of agritourism and the state of scholarly research in this field. One of the possible causes for this can be the limited availability of monthly or quarterly data regarding agritourism in most countries, which would be necessary to assess seasonal fluctuations.

Romania is one the countries where agritourism, rural tourism, as well as the overarching tourism industry data fare well in terms of data availability, accessibility (both via manual queries to databases and programmatic means in statistical software environments, such as R, through the Tempo package [4]), and geographical representation. Data for arrivals, overnight stays, tourism capacity (beds), and number of accommodation units, among others, are available at the regional, county, and, in some cases, local levels [5].

In the case of our study, we will focus on tourism demand, which can be measured using the number of arrivals. Through the study of seasonality in the context of Romanian agritourism and rural tourism, we seek to enable future studies to uncover the possible causal relationship between tourism demand and offer given seasonality and appropriate data sources from Romania or other countries while simultaneously providing a case study in the context of seasonal variations and their impact on tourism.

1.2. Seasonality Definitions

Several complementary perspectives on seasonality have developed on the definition and impact of seasonality, as follows:

A more limited definition of seasonality sees it as the fluctuation in tourism demand over specific periods, which has also been associated with some negative effects, including uneven resource use, loss of profit potential, and strain on social and ecological capacities [6]. As such, seasonal variations impact the tourism carrying capacity of a given region, leading to alternating periods of overcrowding and periods characterized by the under-usage of resources pertaining to tourism [7,8].

According to more general perspectives, seasonality is characterized by well-structured patterns and shapes of fluctuations, and it can be measured from the perspectives of both supply and demand in tourism and other fields [7,9]. The concentration of tourist flows during short periods creates inefficiencies and burdens on destinations' resources, as also highlighted in previous sources. Those variations are cyclical, predictable in nature, and limited within a year [10].

The demand side of tourism seasonality affects tourists' arrivals, number of nights spent at accommodations, length of stay, and other indicators of tourism demand, while the supply comprises available beds, number of active accommodation units, total number of employees, and so on [11,12]. Previous studies attempted to combine these values holistically to examine and compare seasonality in different study areas [13].

The factors influencing seasonal patterns can be classified as natural or as factors mandated by human activities and customs [6,14] Climate factors, weather, geographical location, and environmental factors are natural factors with specific influences on the seasonality of tourism, while national holidays, vacation seasons, weekends, consumer decision-making, income, and economic policies are anthropogenic [6,15].

These factors influence how seasonality manifests, the most common being characterized by a single peak season, either in the summer or, in the case of locations where winter sports are practiced, in the months when snowfall is at its highest levels [1,6,16,17]. Two-peak seasonality can also be encountered, being characterized by a marked increase in tourist arrivals in both summer and winter, while spring and autumn are periods of lessened touristic activities [6,17,18]. Additionally, lessened seasonal variations characteristic of destinations where climatic conditions are stable throughout the year can be classified as destinations with off-peak seasonality [1,6].

1.3. Impact of Seasonal Variations in Agritourism and Rural Tourism

Considering the scope of our research regarding seasonality, of particular interest are the specific traits that define rural tourism and agritourism. Various perspectives emerged in the research literature regarding those types of tourism. The United Nations World Tourism Organization (UNWTO) defines rural tourism as "a type of tourism activity in which the visitor's experience is related to a wide range of products generally linked to nature-based activities, agriculture, rural lifestyle/culture, angling and sightseeing" [19].

The Organization for Economic Co-operation and Development (OECD) views rural tourism as a form of tourism that is located in rural areas, traditional, sustainable, small-scale, and of many different kinds, corresponding to the varying traits that ultimately define the rurality of a specific area [20,21].

There is an inherent link between rural tourism and agritourism, the two terms being sometimes used as synonyms [22,23]. However, other perspectives see them as distinct or that agritourism is a form of rural tourism that focuses more on the agricultural aspect of rural living, both in the marketing and business flows of the accommodation units that practice it, with varying degrees of authenticity and involvement of guests [24,25]. Ultimately, both forms of tourism share the emphasis placed on rurality and tradition, while agritourism is practiced in particular by entrepreneurs in rural areas that must continue to be linked to agricultural activities [26].

In the context of the sustainable development of rural areas, especially from the perspective of agritourism, the research literature provides some insights into the impact of seasonality, underlining negative and some positive aspects.

Mitigating the impact of seasonal fluctuations on the tourism industry is considered a prerequisite, if not a desirable characteristic, for fostering sustainable tourism development [13,27,28]. This can be achieved through implementing price differentiation between peak and off-peak seasons as well as diversifying tourism offerings, attractions, and events throughout the year [15,29,30]. Additionally, tax incentives play a role in this strategy, at least as a means to alleviate the issues caused by seasonality and not seasonality itself [31].

In the field of sustainable rural development, tourism has long been regarded as a means to achieve a more equitable distribution of income, alleviating economic disparities between rural and urban areas [32–34]. It provides incentives for local communities to preserve natural landscapes and traditions, strategically marketing them in a tourism context [35,36]. These practices focus on minimizing the adverse effects of tourism and supporting biodiversity. Thus, sustainable tourism, rural tourism, and agritourism are closely interconnected, aiming to promote practices benefiting the environment, economy, and society [37,38].

Economically, rural tourism and agritourism significantly contribute to local development. By offering opportunities for farmers and local businesses to diversify their income sources, these forms of tourism enhance economic activities in rural areas [32,39]. Diversification is crucial in reducing dependence on specific industries and achieving a balanced income distribution between rural and urban regions [40]. Seasonality contradicts these established goals of sustainable development and is a major issue for businesses in this field. Disruptions to income flow cause uncertainty for farmers and rural entrepreneurs and can cause significant fluctuations in the labor market of the rural regions, endangering the livelihoods of those employed in tourism [13,41].

Social sustainability is advanced through rural tourism and agritourism by preserving cultures and traditions. These forms of tourism often showcase aspects of life that instill pride and a sense of belonging within communities [42]. Sustainable tourism practices encourage community involvement and inclusion in decision-making processes, ensuring the equitable distribution of tourism benefits among stakeholders [43,44]. Seasonality strains social services (healthcare, sanitation, public transport, and order) provided in rural areas during the peak seasons, while also leading to underutilization of said social services during the trough season [45–47].

Rural tourism and agritourism contribute to the environmental aspect of sustainability. Tourists engaged in these forms of tourism learn about sustainable farming practices, biodiversity conservation, and the importance of preserving rural landscapes [38,48]. Moreover, these forms of tourism promote responsible behavior among visitors, encouraging support for local businesses, respect for local customs, and a conscientious approach to minimizing environmental impact [42]. Local communities are also motivated to actively maintain the ecological balance of their living areas. From this perspective, seasonality can be desirable,

allowing nature to regenerate or enabling restoration works to be undertaken during the off-season [49].

Seasonality is also a phenomenon shared with the agricultural production sector, causing another series of concerns and solutions employed in rural areas to alleviate them [50].

On the other hand, rural tourism and agritourism can contribute to the broader sustainability of the tourism industry itself. They can alleviate the issues caused by over-tourism in neighboring regions by redirecting tourists to locations that are farther away, causing a spatial spill-over effect in tourism [51,52]. Alternatively, tourists may prefer the quietness associated with rural areas to rest, while during the day, they may commute to zones with more tourist attractions.

Perhaps of even more interest to our research are the causes of seasonality that are spatial, as highlighted above (climate, weather, geography), which can exert a significant effect. As such, some spatial patterns might become apparent in the analysis of the strength of seasonality. The first hypothesis of our empirical analysis is the following:

H1. *Seasonality exhibits spatial variations and clustering patterns in the studied area, in agritourism arrivals.*

The theoretical literature highlights a key distinction between sustainable and mass tourism, emphasizing factors such as minimizing seasonality effects, lower tourism flow volumes, authenticity, consideration for both tourists and locals, low density, linkages with local sectors, low leakages, a high multiplier effect, and a focus on the well-being of the local community. These factors serve as indicators of the sustainable nature of a touristic destination [53].

Consequently, considering the theoretical classification of agritourism as a type of sustainable tourism [54–56], our study's second hypothesis is formulated as follows:

H2. *Agritourism boarding houses in the studied area are affected by lower seasonality compared to other types of accommodation units.*

However, some researchers present a dissenting perspective, suggesting that seasonality is a limiting factor for sustainable development in rural areas. Previous research indicates spatial heterogeneity in tourism seasonality, emphasizing more pronounced and impactful seasonality in rural and remote areas compared to urban tourism. This seasonality is perceived as a vulnerability for rural households involved in tourism, jeopardizing their livelihoods and the security of villagers. Farmers engaged in tourism operations, often small-scale and family-run, face challenges such as low returns on investment and limited contributions to rural residents' income due to the highly seasonal nature of the market. During low tourism seasons, an oversupply of rural lodges and agritourism accommodation units leads to inefficient asset and equipment usage, resulting in decreased returns for farmers. Employment for farmers in tourism is precarious, with the risk of layoffs during off-seasons, and many serve as temporary workers during peak seasons [28].

Other researchers suggest that seasonality can be moderated by the emergence of cultural tourism and that rural destinations are more prone to this phenomenon [17].

The existing literature on the impact of seasonality on rural tourism reveals a knowledge gap, especially within the context of Romanian tourism and agritourism. While some studies, using robust statistical or qualitative methodologies, have explored seasonality in rural tourism on an international scale, they have predominantly focused on regions such as China or Spain [13,17].

A previous study examined the state of seasonality in Romanian agritourism by comparing between-month variations in touristic arrivals at a NUTS-2 (regional) level [57]. We aim to enhance the understanding of this subject by evaluating spatial correlation networks on seasonality at the LAU-1 (counties) level. This approach will allow us to open the discussion regarding the factors that can influence Romanian seasonality.

The significance of bridging this knowledge gap extends beyond this academic endeavor. Through this, we seek to directly inform policy and managerial decisions that shape the trajectory of rural tourism development in Romania. By discerning the specific nuances of seasonality effects in this region, policymakers, industry stakeholders, and local communities can collaboratively employ interventions tailored to capitalize on peak seasons, mitigate challenges, provide relief during off-peak periods, and cultivate a more resilient and sustainable rural tourism sector.

1.4. Measuring the Presence and Strength of Seasonality

Several quantitative methods and indices have been previously used in order to assess the strength of seasonality in the case of tourism arrivals as well as in other fields such as the labor market, retail, or meteorology [58–60].

Seasonal range is one of the more intuitive methods utilized for assessing seasonality, being defined as the difference between the highest and lowest values in the given period (in most cases, per year) [61,62]. This method is inconclusive in comparisons between time series with different statistical properties and will not be employed in our empirical study.

The seasonality ratio and indicator can instead be used for comparing time series, as they represent the ratio between the largest value in the studied period and the average of that year, and the inverse of this, respectively [62]. However, such indicators do not account for the dynamics in other months or for two-peak seasonality destinations.

The coefficient of variation is similar to the seasonality ratio and indicator and is defined as the ratio between the standard deviation in the time series compared to the mean [63]. An evolving trend component in the time series might affect the results of this calculation.

The GINI coefficient (or index) and the coefficient of variation have been so far widely used, in itself or as an intermediate step in the construction of indices assessing multiple aspects of the economic activity in tourism: arrivals and overnight stays of local and foreign tourists, hired personnel, number of beds available, length of stay, occupancy rates and occupancy on weekends [13]. The GINI coefficient is closely related to the concept of the Lorenz curve, where the latter is a graphical representation of the cumulative percentages of the value assessed starting with the lowest values. Following this, a line of equality is drawn at a 45-degree angle from the point of origin, representing the equal distribution of values [63]. The GINI coefficient is the area located between the Lorenz curve and the line of equality [13,64]. Most statistical packages can compute the GINI index, such as the DescTools package in the R software environment [65].

Overall, the GINI coefficient provides a quantitative measure of the inequality present in time-series data, where a lower GINI value is interpreted as a more equal distribution. This metric offers insights into the evolution of tourist flows throughout the year. A disadvantage of this measure of seasonality is the fact that it does not allow the differentiation of trend from seasonality, as such it should be limited to a relatively short period of study, such as a year. Obtaining a single descriptive value for assessing the strength of seasonality in time series obtained from destinations with seasonal patterns that exhibit outlier values can become difficult, as central tendency calculations, such as average or median, might result in a loss of useful information. On the other hand, if no means of dimensionality reduction are employed, the modeling of time series data in a geo-spatial context may become difficult.

Seasonality is a concept that has also been the subject of many debates in the field of econometrics and forecasting. Borrowing from those fields, we will employ the Seasonal-Trend decomposition using Loess (STL decomposition) to account for both trend variations and seasonality in Romanian tourism, while maintaining low dimensionality for subsequent modeling [66]. This method will be described in Section 2.

1.5. Tourism and Agritourism Characteristics and Evolution in the Studied Area—Romania between 2010 and 2022

Romania is a country situated at the border between Southeastern, Central, and Eastern Europe, distinguished by a rich and vibrant cultural heritage and diverse tourism attractions, providing opportunities for the development of sun and sea tourism, cultural tourism, agritourism, business tourism, and so on [67]. Noteworthy elements include medieval castles and fortresses, such as the Bran Castle or the Sighișoara and Sibiu cities, attractive cities like Bucharest, Timișoara, Iași, and UNESCO World Heritage Sites, both cultural and natural, like the Churches of Moldova, Dacian fortresses and the Danube Delta. Its most attractive natural landscapes encompass the Carpathian Mountains, Danube Gorge, and Danube Delta, as well as the Black Sea coastline, offering opportunities for outdoor activities. The diverse range of touristic features and attractions, both natural and manufactured, enhance the relevance of this study, allowing researchers to further analyze the factors that led to the values of tourism seasonality observed.

In our analysis of the touristic offer of Romania, we identified some disparities between the data provided by the Ministry of Economy, Entrepreneurship, and Tourism (MEET) and those presented in the Tempo Online database (Figure 1) [5,68]. According to the methodology of the Tempo Database, tourist accommodation structures with capacities of less than 5 places are not included in the statistical research [5]. This explains the major differences between the two data sources regarding apartments and private rooms, which are characterized by low capacities. Touristic chalets, villas, and hotels also show differences, but they are not as pronounced as in some other categories.
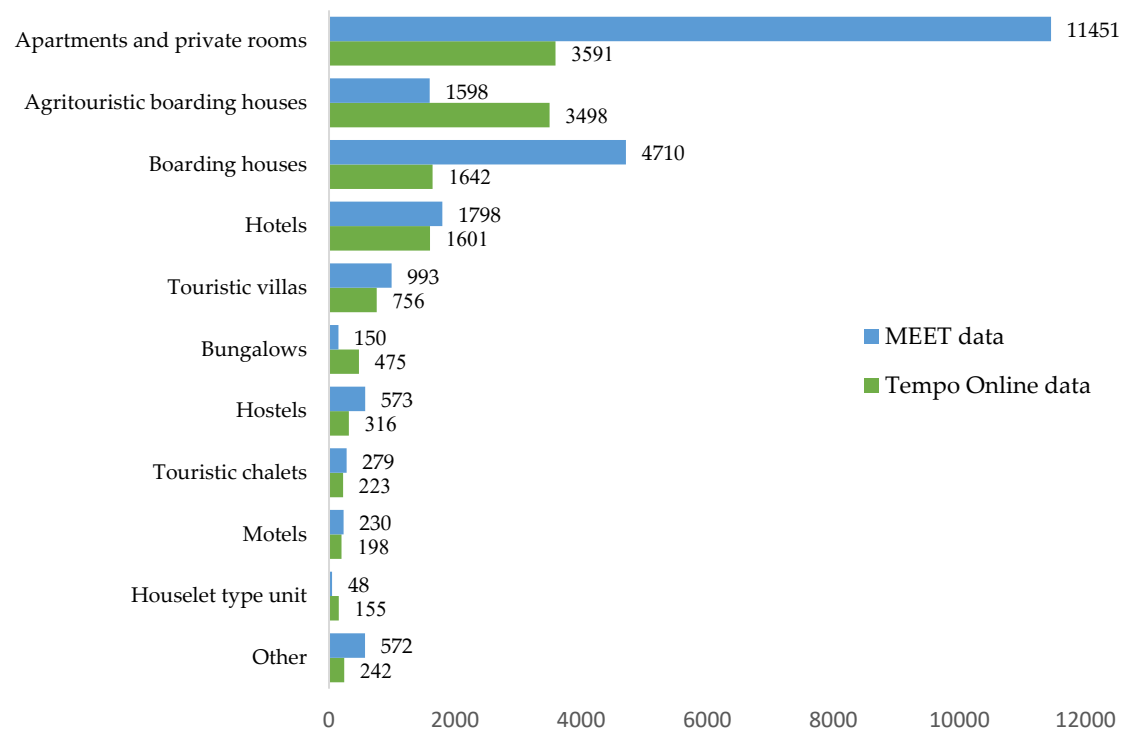

Figure 1. Distribution of accommodation units in Romania, according to the Ministry of Economy, Entrepreneurship and Tourism (MEET) and the Tempo Online database maintained by the National Institute of Statistics.

Furthermore, the Tempo Online database methodological observations show some changes in the data series, specifically the classification of all boarding houses located in urban areas as touristic guesthouses, while the category of agritouristic boarding houses encompasses both rural and agritourist boarding houses.

Because of this, we emphasized analyzing the trend and seasonality scores for both types of accommodation units.

Figure 2 shows the evolution of arrivals to Romanian accommodation units between 2010 and 2023 according to the Tempo Online database. Due to their larger capacities, concentrating a large number of rooms in the same location, hotels dominate the tourist market. Conventional boarding houses and agritouristic boarding houses follow. However, the overall distribution of accommodation units shows that hotels play a continuously decreasing role, from 75.50% of all arrivals in 2010 to 63.10% in 2022. Subsequently, the arrivals to conventional and agritouristic boarding houses rose from 6.7% to 7.77% and from 4.77% to 9.39%, respectively.
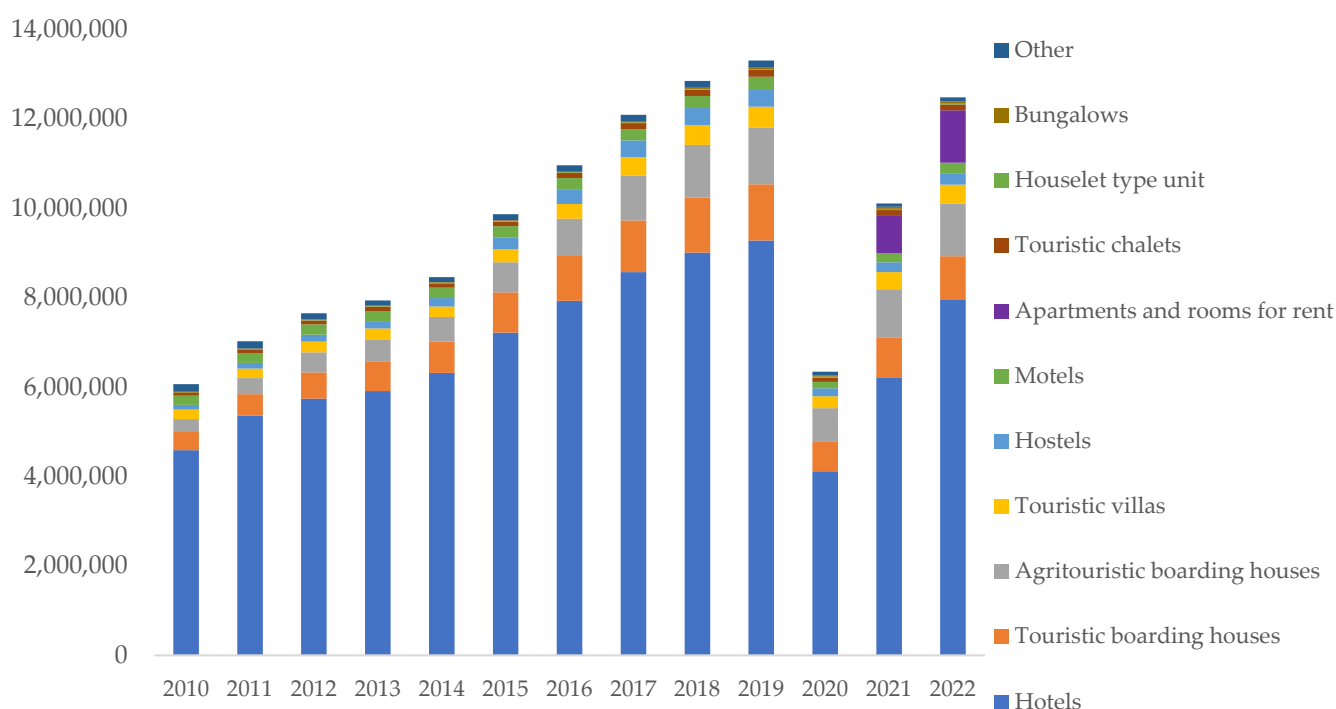

Figure 2. Dynamics of Romanian accommodation units between 2010 and 2022.

The COVID-19 pandemic had a significant effect on touristic arrivals in Romania, as levels reported in 2020 were comparable to those reported ten years earlier. This will also be evident in Table 1.

Table 1. Year-on-year evolution of arrivals by accommodation unit types in Romania (2010–2022).

Year-on-Year Change (%) / Accommodation Type	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2021/2019	2022/2019
Total	15.8	9.3	3.3	6.6	17.2	10.9	10.4	6.3	3.6	−52.2	59.5	23.4	−23.7	−5.9
Total without apartments	15.8	9.3	3.3	6.6	17.2	10.9	10.4	6.3	3.6	−52.2	46.4	21.8	−29.9	−14.6
Hotels	16.8	7.1	2.9	6.9	14.2	9.9	8.1	5.1	3.0	−55.6	50.7	28.1	−33.1	−14.4
Touristic boarding houses	17.9	22.2	11.5	7.8	27.7	13.5	13.4	6.6	1.6	−47.8	36.6	9.4	−28.7	−22.1
Agritourism boarding houses	24.4	24.0	12.2	9.5	22.5	20.9	23.5	16.8	8.5	−40.7	43.9	8.7	−14.6	−7.2
Touristic villas	−0.3	13.6	0.5	−4.5	26.0	12.4	24.8	7.7	5.2	−42.3	43.1	10.0	−17.5	−9.2
Hostels	21.6	21.2	−3.8	28.0	36.4	22.8	18.2	2.4	2.4	−55.5	26.7	14.0	−43.6	−35.7
Motels	8.1	4.4	5.1	−4.4	12.2	1.6	−4.9	6.9	3.2	−48.3	40.4	17.2	−27.3	−14.9
Apartments and rooms for rent	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	40.3	NA	NA
Touristic chalets	8.8	7.3	9.9	−0.9	1.0	23.5	16.6	5.4	6.4	−37.8	36.4	1.3	−15.2	−14.1
Houselet type unit	151.2	39.2	38.3	25.4	−1.8	21.7	−15.8	35.1	25.7	−2.3	37.8	13.3	34.6	52.5
Bungalows	7.0	8.9	−2.3	10.2	35.6	8.1	21.6	25.9	−0.4	−9.7	22.3	−23.8	10.4	−15.8
Other	−4.6	−15.0	−15.4	−5.8	22.8	−4.9	9.5	−2.4	7.6	−46.5	−5.0	25.3	−49.2	−36.3

Table 1 shows the overall growth rates of arrivals for accommodation units located in Romania. Boarding houses and agritouristic boarding houses had better growth rates compared to the national average for most years. Agritourism additionally exhibited a significantly better recovery rate post-COVID than the national average (excluding apartments, which were added to the statistical reporting in 2021). This can be interpreted as a sign of resilience in the face of adversity and an increasing preference for alternative accommodation types compared to hotels, as well as an increasing interest in rural tourism. Most accommodation types show negative percentages in 2022 compared to 2019, indicating the ongoing impact of the COVID-19 pandemic on the tourism industry in 2020.

Major changes to the spatial distribution of Romanian tourism occurred between the year 2010 and 2022 (Figure 3). In most counties, the overall share of touristic arrivals to agritourism and conventional boarding houses rose sharply, in some counties reaching more than 50% of all touristic arrivals. Factors contributing to this shift include changing consumer preferences, a desire for more sustainable and nature-oriented tourism, and targeted efforts by local authorities and businesses to promote these types of accommodations [69]. The consumer trends emphasize a desire to escape to rural tranquility and experience local cuisine and traditional practices. Guests often stay in farmhouses, participating in workshops on traditional crafts and engaging in activities like grape harvesting or other types of activities [70]. This form of tourism also aligns with sustainable principles, promoting responsible travel and supporting local communities, thereby preserving the authenticity of rural life.
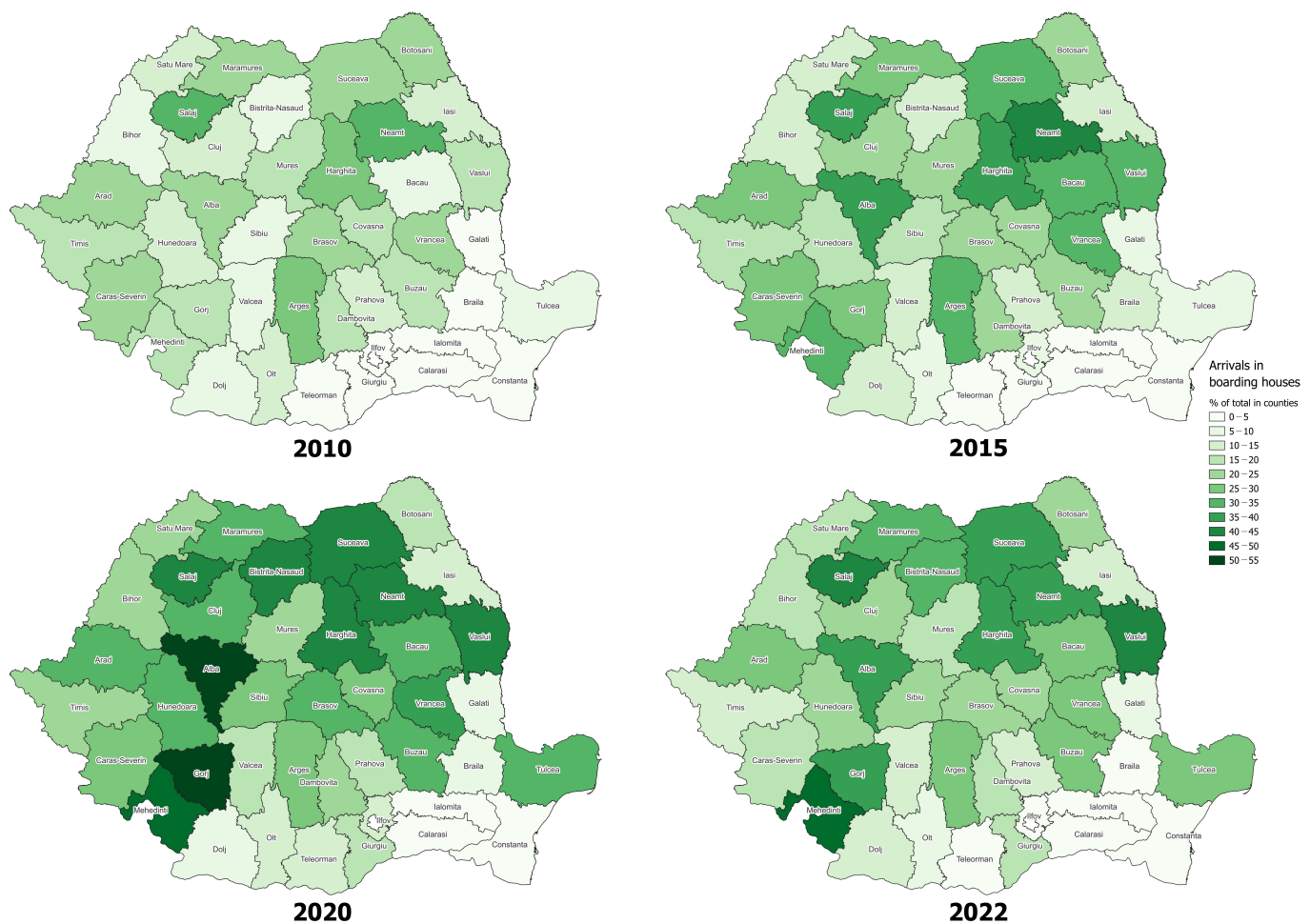

Figure 3. Distribution of arrivals to agritourism and conventional boarding houses as a percentage of the total, by county (2010, 2015, 2020, 2022).

2. Materials and Methods

The main data source for our study is the TEMPO online database, maintained by the Romanian Institute of Statistics as a data repository [5]. Data from this source was used in the empirical analysis of the seasonality of touristic arrivals. The data duration ranges from 2010 to 2023 (monthly data). Additionally, in order to provide some context for a possible limitation inherent to the TEMPO database, the study employs data sourced from the Romanian Ministry of Economy, Entrepreneurship and Tourism, which were analyzed in the first part of Section 1.3., regarding the number and types of accommodation units present in the study area. However, due to data on arrivals being present only in the TEMPO online database, no further comparisons between the two can be reported.

Data collection and processing were conducted using Microsoft Excel Version 2312 and the R programming environment (Rstudio 2023.09.1 Build 494, R version 4.3.2). The TEMPO package sourced from GitHub and addressed in the research literature is used for easy accessing of time series data from the TEMPO online database [4].

After the raw data was obtained in the R programming environment, data cleaning and processing procedures were employed. The downloaded CSV files were loaded, unnecessary columns were removed as recommended by the documentation of the TEMPO package, while the rest were renamed. Furthermore, the resulting data tables were converted to the tsibble format, a tidy format for data tables containing time series, as per the requirements of the feasts and fabletools packages.

The method employed in order to study seasonality in the time series studied will be season-trend decomposition using LOESS (STL).

This technique is particularly valuable as it allows for the separation of the time series into three components: season, trend, and remainder. The seasonal component captures the regular, repeating patterns; the trend component represents the underlying direction of the data; and the remainder accounts for the residuals or irregular fluctuations [71].

In a mathematical form, the data in the time series can be expressed using the following equation:

$$y_t = S_t + T_t + R_t \tag{1}$$

where y_t is the data, S_t is the seasonal component, T_t is the trend component and R_t is the remainder not explained by trend or seasonal variations.

STL decomposition has several advantages over other methods such as SEATS or X11, the most notable ones being robustness to outliers and the fact that it allows for the seasonal component to change over time [72]. Furthermore, the rate of change in seasonality and the smoothness of the trend cycle can be controlled by the researchers (including monotone seasonality), allowing for optimal customization to the specificity of the time series analyzed. A concern in this regard is that setting those two parameters at a value that is too low can lead to overfitting the data.

Other types of seasonal decomposition, in addition to STL, SEATS, or X11, are moving averages, classical decomposition, exponential smoothing (Holt-Winters), Fourier decomposition, and wavelet decomposition, among others. Compared to STL, moving average decomposition is ill-suited to our research due to the latter's focus on trend-cycle analysis rather than on seasonal variations [71]. Classical decomposition is also not recommended due to the assumption of monotonic seasonal patterns and the lack of robustness to outliers [71]. By design, the exponential smoothing models, including Holt-Winters, focus on recent results, while applying exponentially lower weights to results further in the past [73], which is not of interest to our analysis.

Due to our focus on describing and analyzing previously existing trends and not on forecasting, we consider STL decomposition to be an option worth considering for our research as well as future research due to the ease of use of the fable and feasts packages, which produce tidy results for multiple time series. Other types of decomposition that can also be employed, such as Fourier and wavelet, lack such implementations.

STL decomposition as a method applied to time series data can become a powerful lens through which to discern the strength of seasonal and trend variations, as shown in

previous works. Based on the results of the STL decomposition, a measure of seasonality can be calculated as follows:

$$F_S = \max\left(0.1 - \frac{Var(R_t)}{Var\ (S_t + R_t)}\right) \tag{2}$$

where *Fs* is the strength of seasonality, *Var(Rt)* is the variance of the remainder component, and *Var(St)* is the variance of the seasonal component. *Fs* range from 0 to 1, 0 corresponding to a series with no seasonality, while values closer to 1 correspond to a time series with prominent seasonal components.

The strength of the trend component can also be calculated as follows:

$$F_T = \max\left(0.1 - \frac{Var(R_t)}{Var\ (T_t + R_t)}\right) \tag{3}$$

where *Ft* is the strength of the trend component and *Var(Tt)* is the variance of the trend. This is also of interest as this value can allow us to compare the overall growth of the tourism industry.

Recent publications in the field of forecasting in the hospitality industry successfully utilize STL decomposition [74,75]. However, the novelty of this paper consists in the shifted focus of this method away from forecasting towards studying the seasonal component of tourism arrivals [71].

While all methods that can be employed to study seasonality present strengths and weaknesses, the main method chosen for the empirical component of this research is the STL decomposition.

Another aspect that was taken into consideration was the fact that the STL decomposition cannot handle missing values and implicit gaps in the time series. To address this issue, we transformed implicit empty data points into explicit empty values. If the number of consecutive empty values was higher than 4 and if the total number of empty values was higher than 10, the time series was checked and only the longest quasi-continuous section of data was left. Following this, the empty values were replaced by interpolated ones. This ensures the quality of the analysis and the minimization of spurious results due to errors in the data source. Further consideration was given to the lockdowns during the COVID-19 pandemic, which greatly decreased tourism flows, in which case missing data was replaced with 0.

The nature of seasonality in the data was checked visually by plotting the values against time. In the case of a series with a seasonal peak, the decomposition method employed should be STL, while in the case of a series with multiple peaks, MSTL can be used successfully (multiple seasons and trend decomposition using Loess). However, in the latter case, feature extraction must be conducted manually, as the MSTL framework is not integrated into the feasts package framework. This is completed by adapting Equations (2) and (3) to this use case. In our case, as we examined data at a county-wide level, the results were consistent with one-peak seasonality types.

The seasonality strength and trend strength values are calculated after data processing by using the feat_stl function from the feasts package and were modeled in a spatial context using QGIS, with the help of the Spatial Analysis Toolbox.

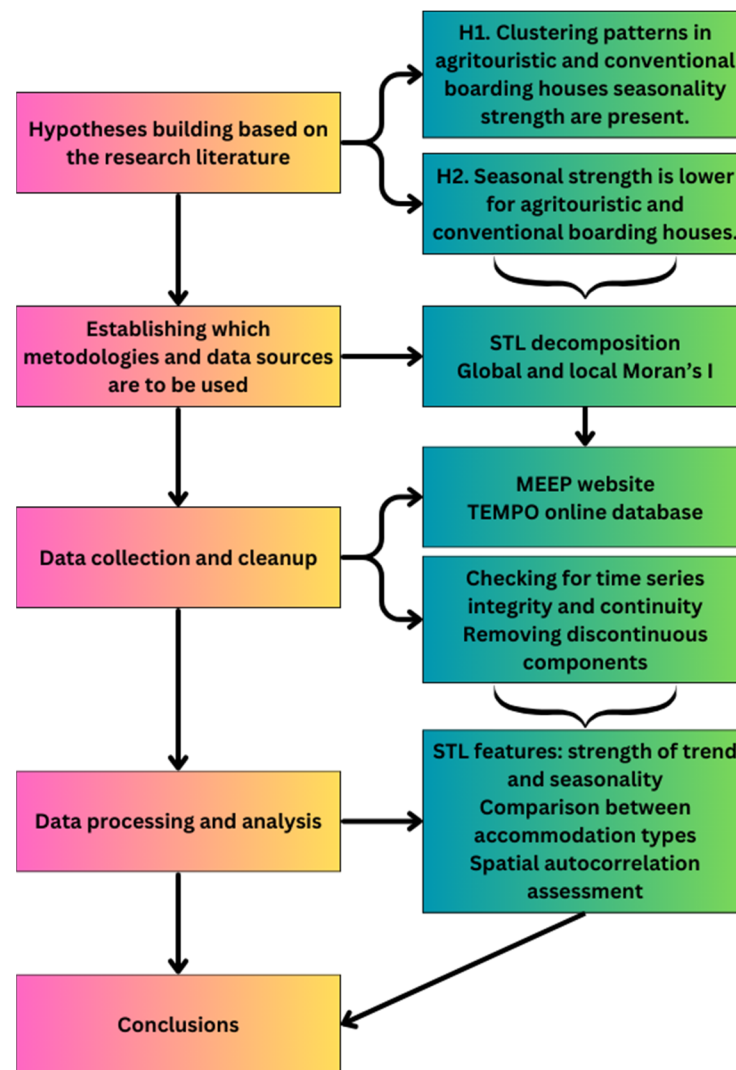The workflow employed in our study is shown below (Figure 4):

Figure 4. Workflow employed in our study.

3. Results

3.1. Trend and Seasonality Strength of Accommodation Units in Romania

The trend and seasonality strength were calculated for boarding houses (including agritouristic and conventional), hotels, and total arrivals, per county. The rest of the accommodation unit types returned inconclusive and unreliable results, as the quality of the available data per month and county was less than ideal. However, several insights can be gained from this approach, as described below:

By examining the trend component of overall arrivals by counties, a common pattern emerges, revealing that the vast majority of the counties exhibit remarkably elevated levels of this key indicator. Among them, Maramureș and Ilfov stand out, boasting an exceptionally elevated level of trend, which suggests that during the last 13 years, it was marked by impressive growth (Figure 5).

Maramureș distinguishes itself as a tourism hub with a trend that surpasses the rest of the counties, signifying robust and sustained growth in visitor numbers. The factors contributing to this are multiple, encompassing both natural and cultural attractions. The region's picturesque landscapes in its rural regions play a pivotal role in drawing visitors seeking a blend of nature and heritage.

Ilfov County is near the country's capital, Bucharest, which could be a significant factor in the development of tourism in the area due to spatial spillover effects.
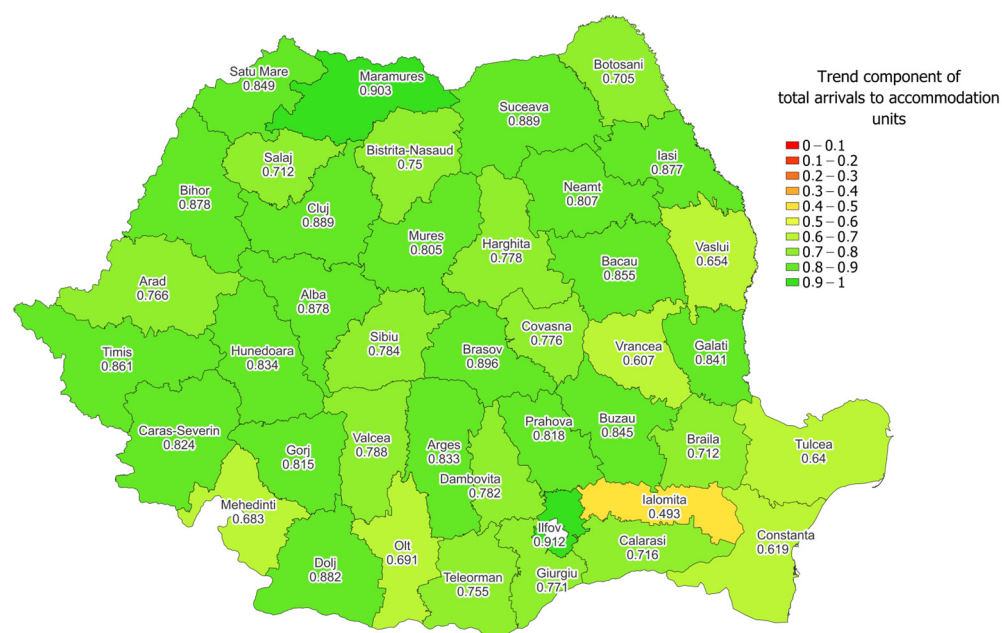
Figure 5. Distribution of trend component for overall arrivals to accommodation units, per county.

On the other hand, the relatively modest level of the strength of trend in Constanța and Tulcea can be attributed to the tourism carrying capacity of those counties, as those regions have previously enjoyed long periods of sustained development, both in the case of the Black Sea shore and of the Danube Delta. Furthermore, the neighboring Ialomița county is also marked by a low trend value. This can also be evidence of a spatial effect, as tourists are drawn more to the counties near it. This development should be of interest to local authorities, which can seek to provide better marketing and support for local businesses.

The country-wide trend strength indicator is at 0.88, suggesting that overall, Romania experienced significant growth during the last years. The trend strength ranged from 0.49 to 0.91.

Seasonal strength values range from 0.32 to 0.98, with Constanta exhibiting the highest seasonal strength (0.98), emphasizing the significant impact of seasonality on tourism in this county. Dolj, Olt, and Teleorman, on the other hand, have notably lower seasonal strengths, leading to less reliance on seasonal fluctuations (Figure 6).

In the case of Constanța and Tulcea, their image is mostly associated with sun and sea tourism, which mostly takes place during the summer months. As such, high values can be expected for those counties. However, as highlighted in the literature review, seasonality is a significant challenge to the sustainable development of tourism and can be associated with the alternating over and under usage of touristic potential and carrying capacity.

An interesting situation arose in Dolj County, which had high levels of trend but significantly lower levels of seasonality than the rest of the country. The exceptionally low seasonal strength of 0.34 suggests that Dolj is less influenced by seasonal fluctuations. This indicates a more evenly distributed flow of tourists throughout the year, reducing the county's dependence on specific seasons. An analogous situation also arose in the Satu Mare and Olt counties, where trend values are high or, in the latter case, moderate, while seasonality is lower.

In the case of Ilfov County, the seasonal strength value is also low, again benefitting from the year-round visitation potential of neighboring București.

The high country-wide seasonal strength of 0.93 underscores the importance of managing seasonality at the national level. Strategic planning to reduce this could further enhance the stability of the national tourism sector and promote a more sustainable tourism industry.
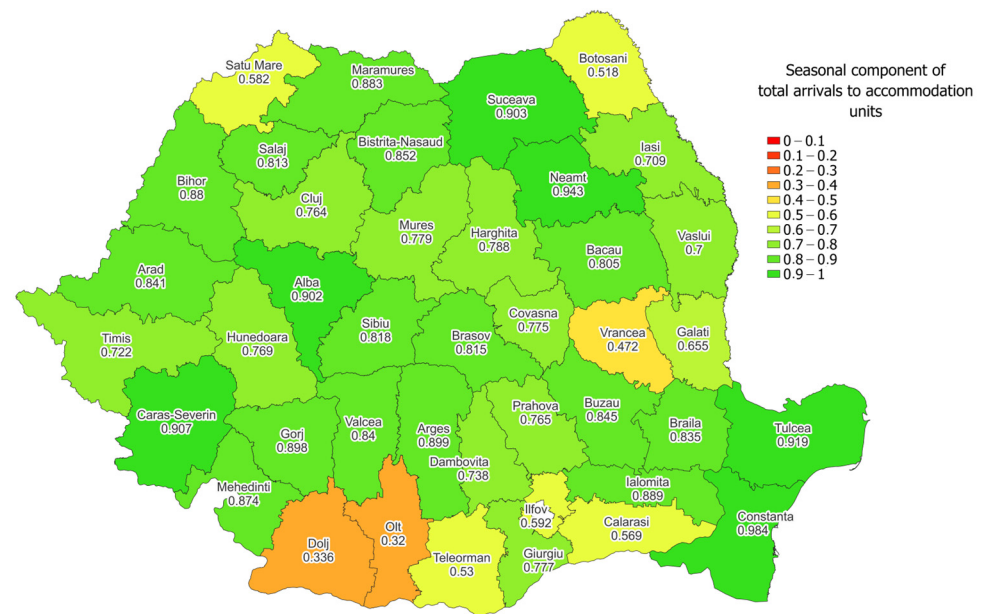
Figure 6. Distribution of seasonal component for overall arrivals to accommodation units, per county.

Counties with notably high trend strengths include Cluj, Prahova, Suceava, Bihor, Brasov, Buzau, Gorj, Hunedoara, and Vâlcea (Figure 7). These counties exhibit strong potential and successful development in agritourism, with high growth rates. Those counties can leverage their success with little further investments in infrastructure and marketing and in the promotion of sustainable practices to further enhance and sustain agritourism growth.
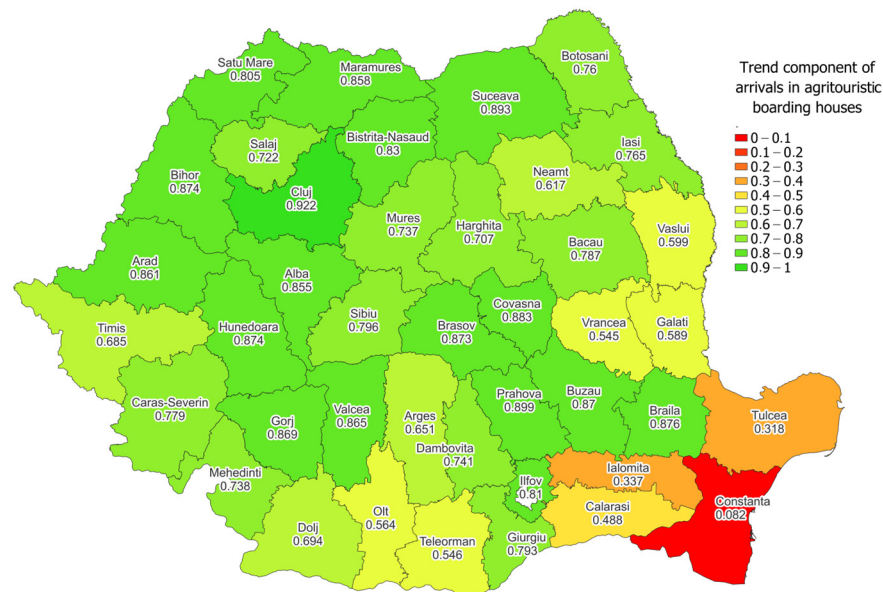

Figure 7. Distribution of trend component of arrivals to agritourism boarding houses, per county.

Several clusters of moderate trends are visible: Vaslui, Galați, and Vrancea are showing similar values, as do Olt and Teleorman. Those counties can benefit greatly from identifying and capitalizing on unique local attractions, improving marketing strategies, and fostering collaborations within the agritourism sector. Indeed, as clusters of counties with similar trend indices are identified, inter-county councils and management strategies can be employed to secure better growth rates for this vital sector of rural tourism and to better utilize their potential.

An aspect worth highlighting in the examination of agritourism boarding house arrivals pertains to the conditions in Constanța County. While this can be seen as a result that can only be interpreted given its context as a destination mostly defined by the presence of hotels, the surrounding counties also show reduced levels of trend strength in arrivals to agritourism establishments. Both Tulcea and Ialomița exhibit low trend strength, while Călărași shows low-to-moderate values. Comparatively to Constanța, a higher percentage of tourists that visit Tulcea do so in agritourism or conventional boarding houses, which suggests that the underlying factors influencing seasonality are at play and not the trend component.

Counties such as Alba, Bihor, Caras-Severin, Gorj, Mehedinți, Neamt, and Suceava have high seasonal strength values (Figure 8). These counties experience significant variations in agritourism activity throughout the year, with pronounced peaks and trough periods. The Cluj County stands out with both high trend strength and seasonality indicating a favorable but fragile situation for continued development, requiring the management of seasonal fluctuations in the near future. Counties with high trend strength and low seasonality are well-positioned for sustained and sustainable growth of tourism, as is the case of Brăila County. By maintaining their current position, this county can become a powerhouse in the field of agritourism, by specializing in this field.
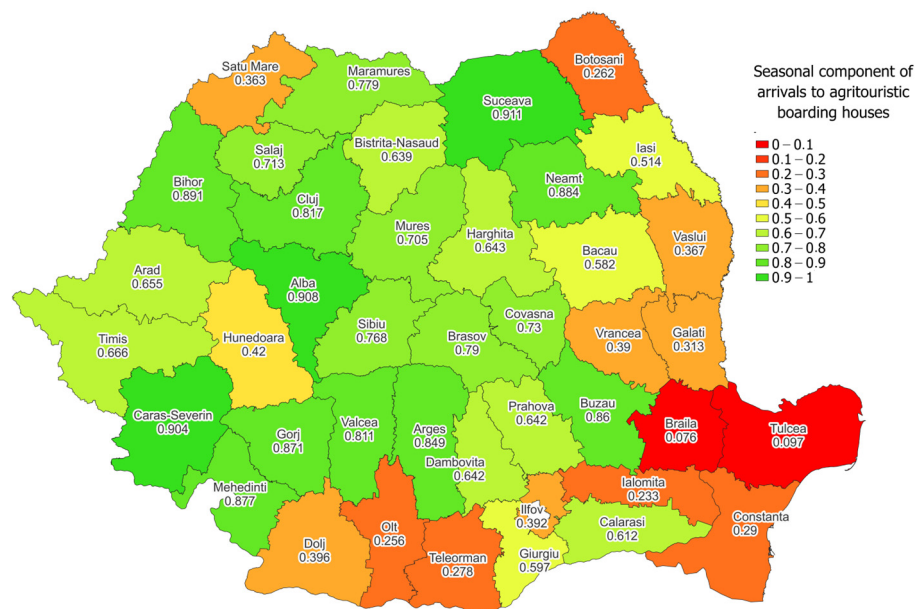

Figure 8. Distribution of seasonal component of arrivals to agritourism boarding houses, per county.

On the other hand, counties such as Ialomita, Olt, Teleorman, Tulcea, and Vrancea: have relatively low trend strength coupled with varying degrees of seasonality. Targeted interventions to boost trend strength and manage seasonality are recommended, as highlighted previously.

It should be noted that overall, the seasonality strength of agritourism at county levels is considerably lower compared to the total arrivals in accommodations. This seems to suggest that, in many cases, agritourism is more resilient to seasonal variations. However, by assessing the country-wide time series of arrivals to agritourism boarding houses, the seasonality strength is noticeably higher and comparable to other types of accommodations. This suggests that the theory in the area of seasonality should be very nuanced when making assessments regarding the impact of this phenomenon in different types of accommodations. Numerous factors can play a significant role in this regard.

Counties like Cluj, Ilfov, and Suceava have high trend components for conventional boarding houses, indicating a consistent and substantial increase in tourism arrivals over time. Most counties exhibit high trend strength values. Counties like Alba, Brasov, and

Timis also exhibit relatively high trend components, suggesting moderate growth (Figure 9).
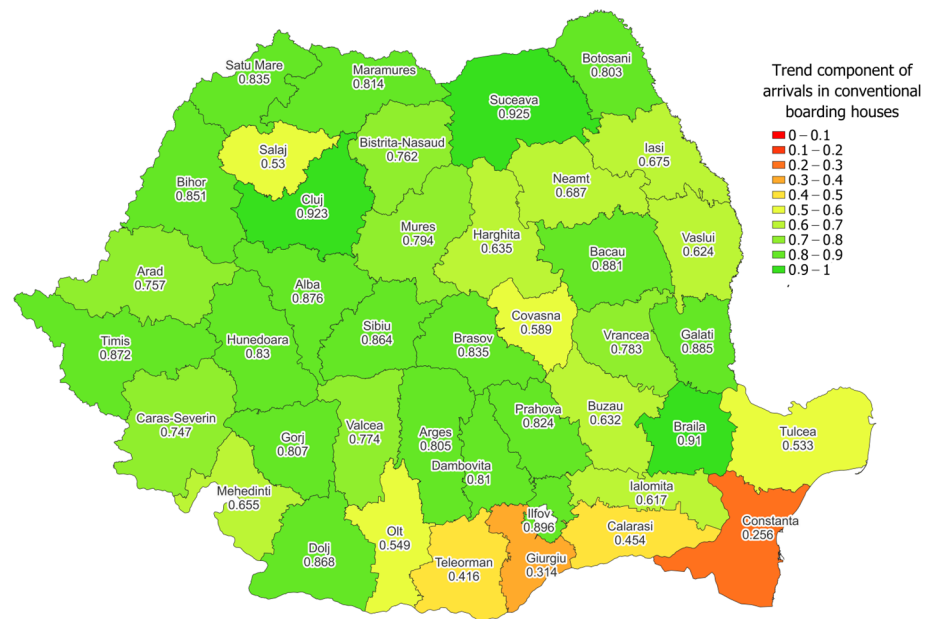

Figure 9. Distribution of trend component of arrivals to conventional boarding houses, per county.

Constanta stands out with a remarkably low trend component (0.26), suggesting stalling values regarding tourism arrivals to boarding houses. A possible cause for this is the preference of tourists in this county for hotels located by the seaside.

Counties such as Constanta, Caras-Severin, and Suceava have high seasonal components, as shown in Figure 10. Interestingly, Tulcea fares better in this regard, being more resilient to seasonal changes, even if the trend component is also moderate. The same is the case for Ilfov and several other counties in the southeastern part of Romania. Interestingly, Hunedoara enjoys both high trend values and low seasonality, which can be explained by the diverse touristic resources in the area, including ancient Dacian fortresses, monasteries, and medieval citadels.
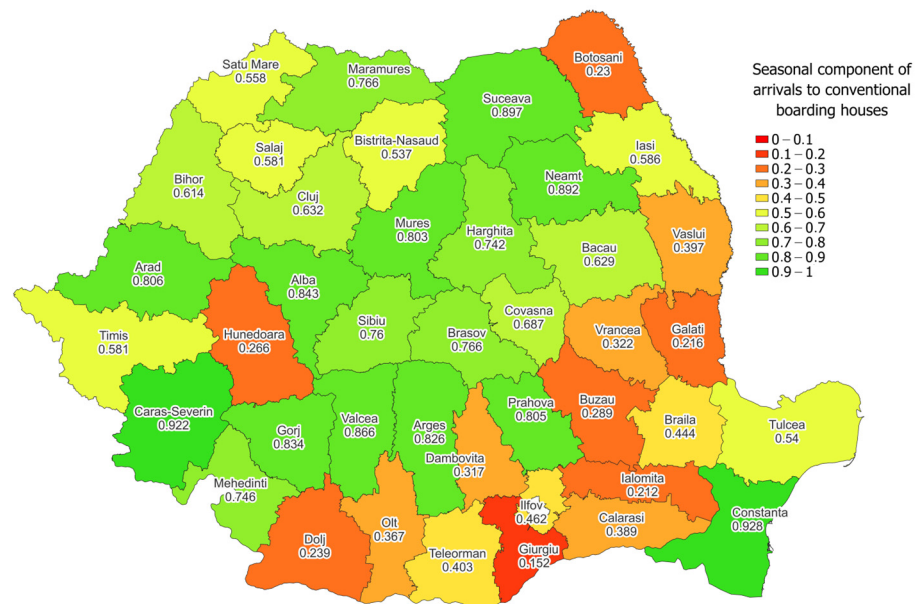

Figure 10. Distribution of seasonal component of arrivals to conventional boarding houses, per county.

Counties like Brasov, Dolj, Iasi, and Timis exhibit high trend strength, while Ialomița stands out again as having a low trend. Other counties with low trend values are Tulcea and Vaslui, as evidenced in Figure 11.
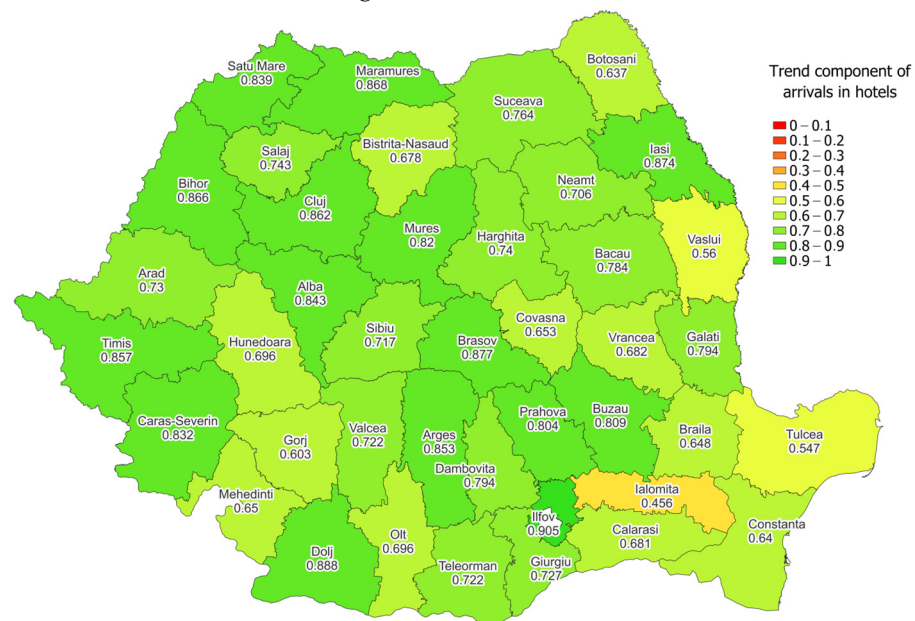

Figure 11. Distribution of trend component of arrivals to hotels, per county.

Counties such as Constanta and Tulcea have exceptionally high seasonal strength values (Figure 12). This indicates significant variability in hotel arrivals throughout the year, influenced by coastal attractions. It should be noted that the seasonal component for those counties in the case of agritourism and conventional boarding houses is exceptionally low. Future perspectives of tourism development in those coastal areas should consider this to provide a counterweight to the sun and sea tourism practiced there.
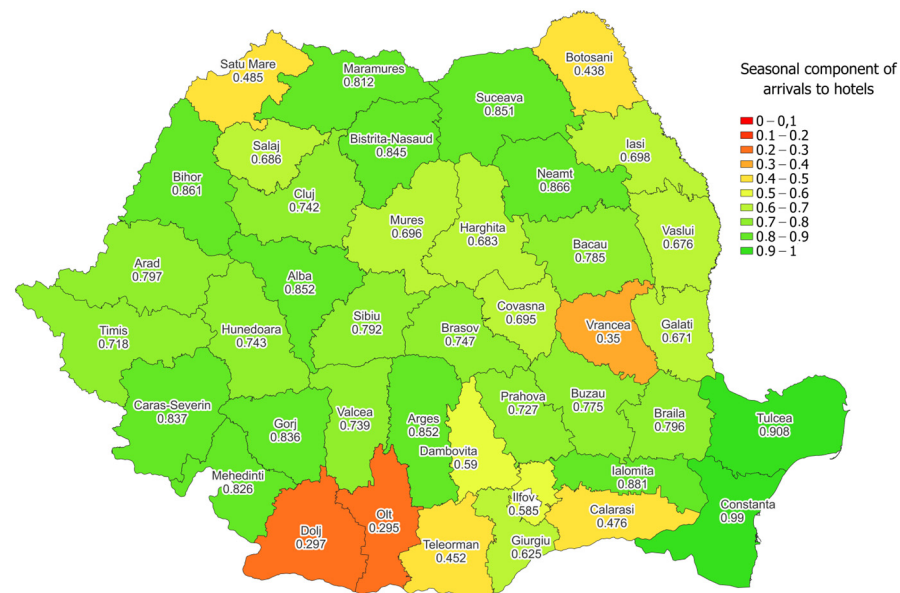

Figure 12. Distribution of seasonal component of arrivals to hotels, per county.

Again, Dolj and Olt seem to be counties with very low seasonal components but with consistent trends.

In order to test our second hypothesis, we compared the seasonal component for agritouristic boarding houses with that of conventional boarding houses, hotels, and overall arrivals.

We found that country-wide, the differences are not significant, but that in some counties, the seasonality of agritourism is significantly lower, mostly in those located on the seaside.

3.2. Spatial Dependencies and Trend-Seasonality Correlation Analysis

To assess the spatial dependence network, we computed both the Global and Local Moran's I indices for the four types of accommodation units studied. Our results show that spatial correlations are insignificant for all but agritourism boarding houses, as shown in Table 2.

Table 2. Global Moran's I value for the types of accommodation units studied.

Accommodation Unit Type	Moran's and *p*-Value for Trend	Moran's and *p*-Value for Seasonality
Agritourism boarding houses	0.32 (0.0002) ***	0.33 (0.0001) ***
Conventional boarding houses	0.15 (0.055)	0.12 (0.124)
Hotels	0.00 (0.742)	0.12 (0.128)
Total	0.05 (0.410)	0.08 (0.233)

The *p* values for the global Moran's I show that only in the case of agritourism boarding houses there is a statistically significant spatial autocorrelation, where $p < 0.001$, symbolized by the "***" symbol.

Since the only significant global spatial correlations were found for agritourism boarding houses and because those are the focus of our research, we applied the local Moran's I algorithm for identifying clusters to this accommodation type. The results for the trend index are shown in Figure 13.
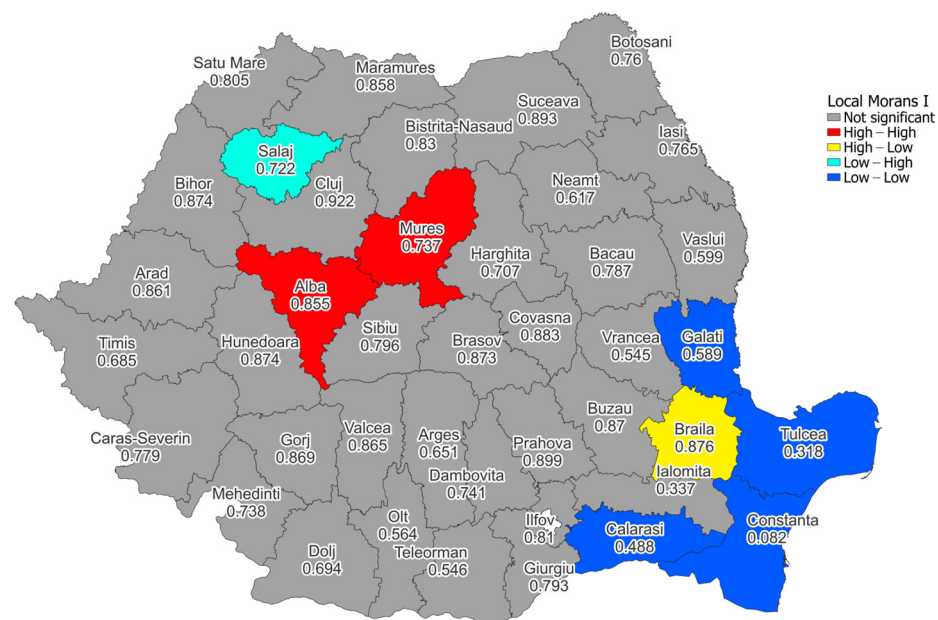

Figure 13. Local Moran's I applied to trend strength in agritourism.

It is apparent that agritourism development was not favored in the regions surrounding the seaside and that conventional tourism there plays a more significant role. However, some areas that are consistently recording high trend levels are in the center of the country, with a significant cluster being composed of the Alba and Mureș Counties, which are surrounded by other counties that also report high trend values. The outliers are Sălaj and Brăila, where the spatial correlations are inverse: Sălaj is surrounded by counties with

higher trend levels, while Brăila by counties with lower trend. This is a finding that can open new avenues for research regarding how the growth of agritourism is influenced by geographical and anthropic factors.

Based on the results of the local Moran's I calculations (Figure 14), central Romania is characterized by high seasonal patterns in the field of agritourism, while the seaside is less prone to those. This runs counter to the conventional wisdom of pronounced seasonality in areas with conventional tourism development. However, reduced trend values are also recorded in those areas, limiting the economic advantages deriving from low seasonality. A possible implication of this finding is the need for those counties to redefine their touristic identity and to promote agritourism within their confines.
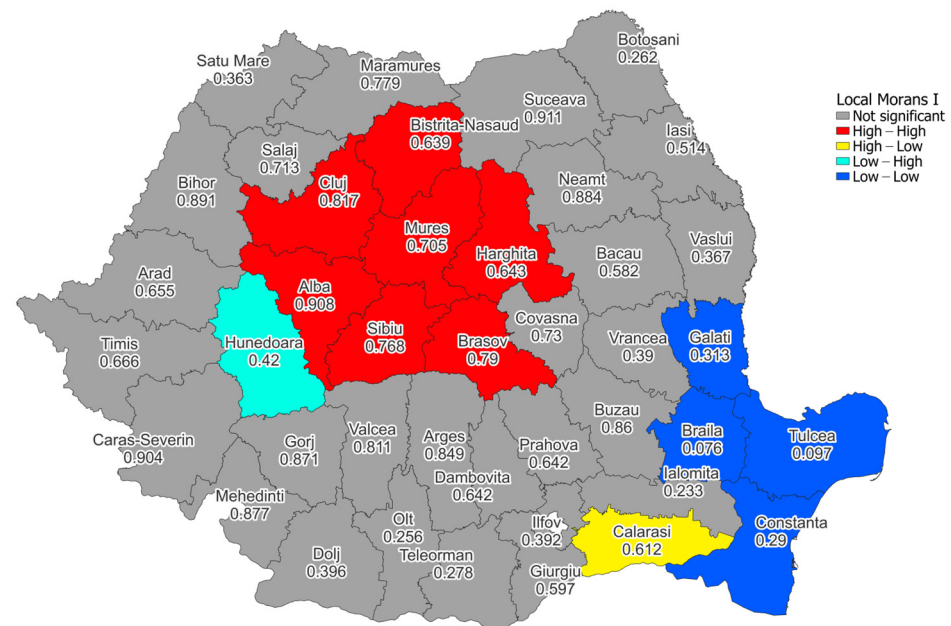

Figure 14. Local Moran's I applied to seasonality in agritourism.

In the case of Central Romania, elevated levels of both trend levels and seasonality are in accordance with previous findings in the research literature: agritourism is severely impacted by seasonal patterns.

Figure 15 presents the Spearman correlation matrix between the trend and seasonality of the studied accommodation units in 41 counties (*n* = 41). Spearman correlation was used because its results do not require normality, a feature that was not present in our dataset, as tested with the Shapiro-Wilk test. Correlations that are not statistically significant (*p* = 0.05) are not represented in the matrix. As such, the values are color-coded based on correlation strength and are reported in numeric form.

No negative correlations were found in our analysis.

While Moran's I calculations were based on spatial characteristics, this matrix describes the intra-county dynamics of arrivals. According to the results, the agritouristic trend is most correlated with the total trend, that of boarding houses, and with the seasonality in agritouristic boarding houses. We can infer that agritourism is a vital component of the tourism industry, contributing greatly to its overall development. However, the positive correlation between agritourism seasonality and trend is unique among the accommodation units studied, meaning that the growth of agritourism can be associated with worsening seasonal fluctuations.

The growth of agritourism is also associated with that of conventional boarding houses, forming a synergy in the context of rural tourism.

The agritouristic trend is also associated with seasonality in this touristic sector. This is of particular concern for both entrepreneurs and the local authorities. While consistent growth is desirable to an extent to all rural stakeholders, heightened seasonality poses

significant challenges, as described in the introduction. A question of future research in agritourism in particular is the need to satisfy labor demands with seasonal workers. Due to its focus on family-owned enterprises, local products, and local customs, this situation might not be seen favorably by farmers and rural entrepreneurs, who might view agritourism as a supplementary income source, while focusing on agriculture itself [41].
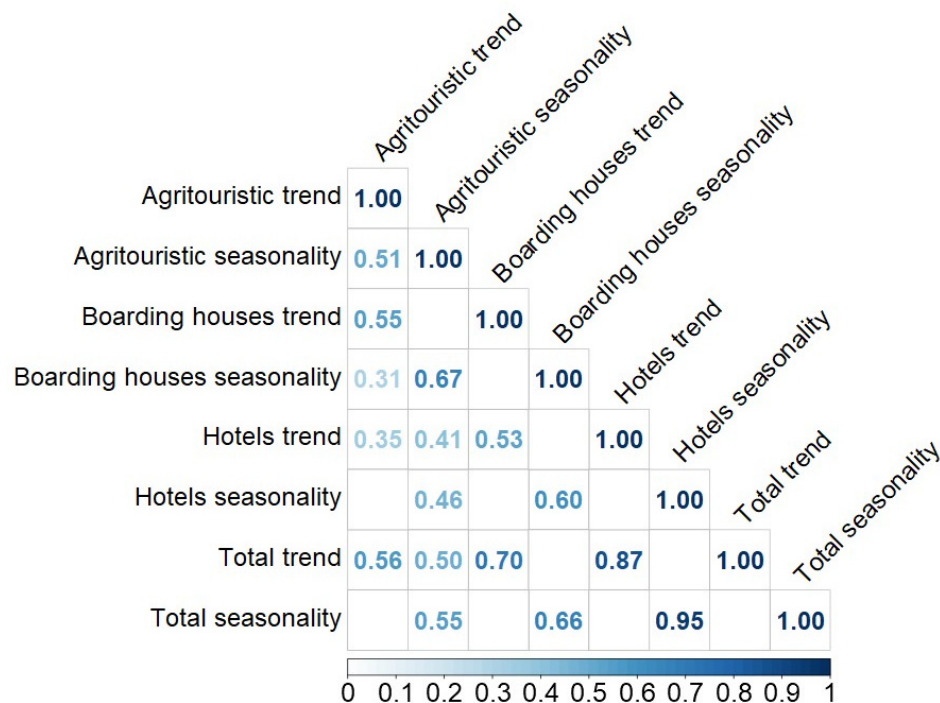

Figure 15. Correlation matrix between trends and seasonality (Spearman correlation).

Other correlations that are weaker are between the agritourism trend, hotels trend, and boarding houses trend, respectively.

Seasonality in agritourism is correlated most strongly with that of boarding houses, followed by total seasonality and total trend. We can infer that both agritourism and conventional boarding houses share some common elements that shape the seasonal character of arrivals, both natural and anthropic. A weaker relationship between hotel trends and seasonality was also discovered, suggesting that the factors influencing seasonality for hotels and agritouristic boarding houses are different.

4. Discussion

4.1. General Discussions and Implications

Seasonality is an important characteristic of tourism, influencing its sustainable character and the economic performance of actors in this sector. As such, through our study, we analyzed both seasonal variations and overall trend characteristics in Romanian tourism, emphasizing arrivals to agritourism and conventional boarding houses. Our first hypothesis is supported both at country-wide and regional levels, suggesting that spatial factors are instrumental to the seasonality of agritourism, as opposed to overall arrivals, as well as those to hotels and conventional boarding houses. Considering this, cooperative practices between the county-level state apparatus and businesses in agritourism should be extended to regional levels, for all counties to benefit from measures aimed at reducing seasonality, as can be the case of the cluster located in Central Romania exhibiting high seasonality and growth. Of particular interest is the fact that agritourism seasonality is particularly low in counties close to the seaside, where sun and sea tourism is expected to be practiced. This can be a sign that agritourism can be a strong contender to conventional tourism in those areas. If the correlation between trend and seasonality is deterministic, the growth of

agritourism in those regions should not be particularly concerning for businesses operating there, as there seems to be room for expanding those sectors.

The intra-county correlation shows that there is a strong connection between agritourism and overall tourism growth, as well as a synergy with conventional boarding houses in rural tourism. Seasonality in agritourism is a concern for entrepreneurs and local authorities, posing challenges in managing consistent growth. We also found weaker correlations between hotel trends and seasonality, suggesting the existence of differences in the factors influencing seasonality for hotels and agritouristic boarding houses. Overall, our study aims to emphasize the significance of agritourism in the broader tourism industry and highlights the challenges posed by seasonal fluctuations.

The second hypothesis should be treated with more nuance, as on the country level the differences between the seasonal fluctuations of several types of accommodation units were minimal. However, some regions are less prone to seasonality regarding agritourism. Surprisingly, the seaside agritouristic offer is attractive throughout the year, as opposed to those of hotels. This is significant to those regions, as they can maintain consistent touristic arrivals throughout the year by improving and marketing agritourism accommodations.

Another aspect tangentially related to this hypothesis is the positive correlation between seasonality and trend in arrivals to agritouristic boarding houses. Growth prospects and the economic benefits associated with them are hindered by heightened seasonal fluctuations, a situation that is not shared with hotels, boarding houses, and total touristic arrivals.

As such, we cannot outright reject or accept such a hypothesis, and further research is needed to clarify the factors that influence seasonality in the context of Romanian and international agritourism. Furthermore, confirmatory and exploratory studies regarding the methodological context of seasonality should also be of interest to researchers, especially when dealing with touristic arrivals or other variables of interest corresponding to other countries or regions.

Comparisons with previous works regarding seasonality should take into account the difference in methodologies employed to assess its amplitude, as STL decomposition was not a method previously used in this manner. However, generally, it was found that tourism in rural areas is more likely to suffer from elevated levels of seasonality, as compared to areas that are focused on business or cultural tourism, as is the case with most urban areas, at least in some cases [13]. According to our research, as stated above, in some areas where overall tourism arrivals are very seasonal, agritourism seems to be more stable. As such, those areas would benefit from a development strategy focused on agritourism.

Furthermore, other studies suggested that those strategies should be tailored to fit the traits of both tourists and the touristic destination [76]. This same research found that rural tourism practiced during the low seasons in Northern Portugal tends to be visitors with high destination loyalty, which are a valuable asset ensuring the survival of rural enterprises [76].

Other studies emphasized the importance of climatic factors in the seasonality of several rural tourism destinations [77]. In the case of Romania, the differences in this regard are minimal, while seasonality patterns and differences in seasonality between regions are detectable. However, other factors identified in previous works that are of interest in the case of Romanian agritourism are socioeconomic or related to infrastructure. Future studies may assess the impact of those factors on seasonality and trend values in Romanian or international agritourism arrivals or for the hospitality industry in general.

4.2. Limitations and Future Avenues for Research

Several limitations to our research were identified, which can be addressed by future studies. Firstly, due to the novel application of the STL method to the tourism industry time series, studies regarding other geographical areas that would be suitable for direct comparison with Romania are absent at the time of writing this paper. Indirect comparisons,

as with those made in the Discussions Section may be less adequate than those between studies employing the same method.

Another limitation of our study is the lack of data regarding agritourism in other countries. Romanian statistical databases are adequate in providing monthly data regarding the hospitality industry, in terms of available capacity, arrivals, overnight stays, and so on. This was one of the reasons for choosing Romania as a country of reference in this study. Future studies may use data from other touristic destinations and compare the results with those obtained in Romania.

Thirdly, confirmatory studies may be undertaken on the Romanian dataset to test the validity of the results presented in this paper. Other methods may yield differing results for some regions, which may be the results of some of the shortcomings of the research method employed in either case. Studies utilizing multiple methods may also be of interest for future research.

5. Conclusions

While seasonal fluctuations are a cause of concern for Romanian tourism, overall trend rates are also high. The continued growth of those sectors should be matched with interventions promoting a more stable livelihood for actors in the agritourism field, including tax incentives and holiday schedules that are more flexible and that do not place as much of a strain on the industry.

As such, based on our research, we see that a cluster of high growth and conversely, high seasonality in agritourism is located in Central Romania. Low-high outliers are the Sălaj and the Hunedoara counties, which have comparatively low trend and seasonality values compared to neighboring counties. In the case of Sălaj County, a more engaged approach toward promoting agritourism can be beneficial, both for local authorities and businesses. Previous research notes the touristic potential of this region [78,79]. On the other hand, Hunedoara County seems to be less prone to seasonal variations than its neighbors, while maintaining high trend values. This indicates that in addition to the factors previously mentioned in the research literature, seasonality can also be alleviated through the usage of touristic potential. Again, further studies are required to confirm and explore this.

The high-low outliers are Brăila and Călărași for trend and seasonality, respectively. Brăila seems to exhibit higher trend values than its neighbors regarding seasonality, while Călărași has higher seasonality than neighboring counties. A diversification of the tourist offers on the seaside and in the Danube Delta might be advantageous for those counties.

The significance of this research paper lies in the novel application of the STL decomposition method to the tourism industry time series, the emphasis placed on agritourism compared to conventional tourism, and the addition of a previously poorly explored geographical domain in terms of studies regarding seasonality, Romania.

In conclusion, through this paper, we seek to reopen the discussion on seasonality and focus it on agritourism. This field of the hospitality industry is doubly affected by this phenomenon, both through its dependence and emphasis on agriculture and traditional rural living, and through the seasonal variations inherent to tourism. More research in this direction would bring results that are relevant to the sustainable development of rural regions, relevant from the perspective of the United Nations SDG [80,81]. Future studies can utilize multiple methods for assessing seasonality and benchmark them, or they can explore different geographic areas and compare the results.

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Data Availability Statement: Publicly available datasets were analyzed in this study. This data can be found here: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table, accessed on 4 December 2023.

References

1. Butler, R. Seasonality in tourism: Issues and implications. *Tour. Rev.* **1998**, *53*, 18–24. [CrossRef]
2. Rudihartmann. Tourism, seasonality and social change. *Leis. Stud.* **1986**, *5*, 25–33. [CrossRef]
3. Ritchie, J.B.; Beliveau, D. Hallmark events: An evaluation of a strategic response to seasonality in the travel market. *J. Travel Res.* **1974**, *13*, 14–20. [CrossRef]
4. Necula, M.; Țîru, A.M.; Oancea, B. Tempo—An R package to access the TEMPO—Online database. *Rom. Stat. Rev.* **2019**, *3*, 61–71.
5. National Institute of Statistics. Touristic Time Series. Available online: http://statistici.insse.ro:8077/tempo-online/#/pages/tables/insse-table (accessed on 4 December 2023).
6. Zvaigzne, A.; Litavniece, L.; Dembovska, I. Tourism seasonality: The causes and effects. *Worldw. Hosp. Tour. Themes* **2022**, *14*, 421–430. [CrossRef]
7. Alshuqaiqi, A.; Omar, S.I. Causes and implication of seasonality in tourism. *J. Adv. Res. Dyn. Control Syst.* **2019**, *11*, 1480–1486.
8. Sæþórsdóttir, A.D.; Hall, C.M.; Stefánsson, Þ. Senses by seasons: Tourists' perceptions depending on seasonality in popular nature destinations in Iceland. *Sustainability* **2019**, *11*, 3059. [CrossRef]
9. Dzhusov, O.; Smerichevskyi, S.; Sardak, S.; Klimova, O.; Benenson, O. The application features of seasonal-cyclic patterns in international financial markets. *Acad. Account. Financ. Stud. J.* **2019**, *23*, 1–10.
10. Lisovski, S.; Ramenofsky, M.; Wingfield, J.C. Defining the Degree of Seasonality and its Significance for Future Research. *Integr. Comp. Biol.* **2017**, *57*, 934–942. [CrossRef]
11. Pulina, M.; Biagi, B. The evolution of tourism demand and supply: A regional policy study. *Int. J. Tour. Policy* **2010**, *3*, 237–256. [CrossRef]
12. Mihai, V.C.; Dumitras, D.E.; Oroian, C.; Chiciudean, G.O.; Arion, F.H.; Mureșan, I.C. Exploring the Factors Involved in Tourists' Decision-Making and Determinants of Length of Stay. *Adm. Sci.* **2023**, *13*, 215. [CrossRef]
13. Martín Martín, J.M.; Salinas Fernández, J.A.; Rodríguez Martín, J.A.; Ostos Rey, M.d.S. Analysis of Tourism Seasonality as a Factor Limiting the Sustainable Development of Rural Areas. *J. Hosp. Tour. Res.* **2020**, *44*, 45–75. [CrossRef]
14. Chung, J.Y. Seasonality in tourism: A review. *E-Rev. Tour. Res.* **2009**, *7*, 82–96.
15. Corluka, G. Tourism seasonality–an overview. *J. Bus. Paradig.* **2019**, *4*, 21–43.
16. Rujescu, C.I. Optimal Period for Winter Mountain Tourism in Romania. *Sustainability* **2022**, *14*, 3878. [CrossRef]
17. Zhang, J.; Yu, Z.; Miao, C.; Li, Y.; Qiao, S. Cultural Tourism Weakens Seasonality: Empirical Analysis of Chinese Tourism Cities. *Land* **2022**, *11*, 308. [CrossRef]
18. Yang, J.; Zhang, Z.; Li, X.; Xi, J.; Feng, Z. Spatial differentiation of China's summer tourist destinations based on climatic suitability using the Universal Thermal Climate Index. *Theor. Appl. Climatol.* **2018**, *134*, 859–874. [CrossRef]
19. United Nations World Tourism Organisation. Rural Tourism. Available online: https://www.unwto.org/rural-tourism (accessed on 15 January 2024).
20. Lane, B. What is rural tourism? *J. Sustain. Tour.* **1994**, *2*, 7–21. [CrossRef]
21. Organisation for Economic Co-Operation and Development. *Tourism Strategies and Rural Development*; Organisation for Economic Co-Operation and Development: Paris, France, 1994.
22. Pérez-Olmos, K.N.; Aguilar-Rivera, N. Agritourism and sustainable local development in Mexico: A systematic review. *Environ. Dev. Sustain.* **2021**, *23*, 17180–17200. [CrossRef]
23. Lak, A.; Khairabadi, O. Leveraging Agritourism in Rural Areas in Developing Countries: The Case of Iran. *Front. Sustain. Cities* **2022**, *4*, 863385. [CrossRef]
24. Phillip, S.; Hunter, C.; Blackstock, K. A typology for defining agritourism. *Tour. Manag.* **2010**, *31*, 754–758. [CrossRef]
25. Corneliu, M.; Brad, M.L.; Avram, E. The Concept of Rural Tourism and Agritourism. *Vasile Goldiş* **2010**, *5*, 39–42.
26. Sonnino, R. For a 'piece of bread'? Interpreting sustainable development through agritourism in Southern Tuscany. *Sociol. Rural.* **2004**, *44*, 285–300. [CrossRef]
27. Su, Z.; Wen, R.; Zeng, Y.; Ye, K.; Khotphat, T. The Influence of Seasonality on the Sustainability of Livelihoods of Households in Rural Tourism Destinations. *Sustainability* **2022**, *14*, 10572. [CrossRef]
28. Su, Z.; Aaron, J.R.; Guan, Y.; Wang, H. Sustainable livelihood capital and strategy in rural tourism households: A seasonality perspective. *Sustainability* **2019**, *11*, 4833. [CrossRef]

29. Mauri, A.G.; Sainaghi, R.; Viglia, G. The use of differential pricing in tourism and hospitality. In *Strategic Perspectives in Destination Marketing*; IGI Global: Hershey, PA, USA, 2019; pp. 113–142.

30. Cannas, R. An overview of Tourism Seasonality: Key concepts and policy. *AlmaTourism* **2012**, *3*, 40–58.

31. Dalir, S.; Mahamadaminov, A.; Olya, H.G. Airbnb and taxation: Developing a seasonal tax system. *Tour. Econ.* **2021**, *27*, 365–378. [CrossRef]

32. Iancu, T.; Adamov, T.; Petroman, I.; Claudia, S.; Milin, A.; Șuba, A.; Pascariu, L. Agritourism-supplementary income source for the rural population. *Agric. Manag./Lucr. Stiintifice Ser. I Manag. Agric.* **2020**, *22*, 127.

33. Adamov, T.; Ciolac, R.; Iancu, T.; Brad, I.; Peț, E.; Popescu, G.; Șmuleac, L. Sustainability of agritourism activity. Initiatives and challenges in Romanian mountain rural regions. *Sustainability* **2020**, *12*, 2502. [CrossRef]

34. Ciolac, R.; Adamov, T.; Iancu, T.; Popescu, G.; Lile, R.; Rujescu, C.; Marin, D. Agritourism-A Sustainable development factor for improving the 'health'of rural settlements. Case study Apuseni mountains area. *Sustainability* **2019**, *11*, 1467. [CrossRef]

35. Gao, J.; Barbieri, C.; Valdivia, C. Agricultural landscape preferences: Implications for agritourism development. *J. Travel Res.* **2014**, *53*, 366–379. [CrossRef]

36. Hatan, S.; Fleischer, A.; Tchetchik, A. Economic valuation of cultural ecosystem services: The case of landscape aesthetics in the agritourism market. *Ecol. Econ.* **2021**, *184*, 107005. [CrossRef]

37. Karampela, S.; Andreopoulos, A.; Koutsouris, A. "Agro", "Agri", or "Rural": The Different Viewpoints of Tourism Research Combined with Sustainability and Sustainable Development. *Sustainability* **2021**, *13*, 9550. [CrossRef]

38. Muresan, I.C.; Oroian, C.F.; Harun, R.; Arion, F.H.; Porutiu, A.; Chiciudean, G.O.; Todea, A.; Lile, R. Local Residents' Attitude toward Sustainable Rural Tourism Development. *Sustainability* **2016**, *8*, 100. [CrossRef]

39. Micu, M.M.; Dumitru, E.A.; Vintu, C.R.; Tudor, V.C.; Fintineru, G. Models Underlying the Success Development of Family Farms in Romania. *Sustainability* **2022**, *14*, 2443. [CrossRef]

40. Pitrova, J.; Krejčí, I.; Pilar, L.; Moulis, P.; Rydval, J.; Hlavatý, R.; Horakova, T.; Ticha, I. The economic impact of diversification into agritourism. *Int. Food Agribus. Manag. Rev.* **2020**, *23*, 713–734. [CrossRef]

41. Chang, H.H.; Mishra, A.K.; Lee, T.H. A supply-side analysis of agritourism: Evidence from farm-level agriculture census data in Taiwan. *Aust. J. Agric. Resour. Econ.* **2019**, *63*, 521–548. [CrossRef]

42. Khamung, R. A study of cultural heritage and sustainable agriculture conservation as a means to develop rural farms as agritourism destinations. *Humanit. Arts Soc. Sci. Stud. (Former Name Silpakorn Univ. J. Soc. Sci. Humanit. Arts)* **2015**, *15*, 1–36.

43. Addinsall, C.; Scherrer, P.; Weiler, B.; Glencross, K. An ecologically and socially inclusive model of agritourism to support smallholder livelihoods in the South Pacific. *Asia Pac. J. Tour. Res.* **2017**, *22*, 301–315. [CrossRef]

44. Karampela, S.; Papapanos, G.; Kizos, T. Perceptions of Agritourism and Cooperation: Comparisons between an Island and a Mountain Region in Greece. *Sustainability* **2019**, *11*, 680. [CrossRef]

45. Caponi, V. The economic and environmental effects of seasonality of tourism: A look at solid waste. *Ecol. Econ.* **2022**, *192*, 107262. [CrossRef]

46. Rosselló, J.; Sansó, A. Yearly, monthly and weekly seasonality of tourism demand: A decomposition analysis. *Tour. Manag.* **2017**, *60*, 379–389. [CrossRef]

47. Momani, H.R.; Som, A.P.M.; Al Qassem, A.; Salim, M.A.M.; Eppang, B.M. The Effects of Seasonality on Mice Tourism Demand in Jordan. *Plan. Malays.* **2023**, *21*. [CrossRef]

48. Weyland, F.; Colacci, P.; Cardoni, A.; Estavillo, C. Can rural tourism stimulate biodiversity conservation and influence farmer's management decisions? *J. Nat. Conserv.* **2021**, *64*, 126071. [CrossRef]

49. Duxbury, N.; Bakas, F.E.; Vinagre de Castro, T.; Silva, S. Creative tourism development models towards sustainable and regenerative tourism. *Sustainability* **2020**, *13*, 2. [CrossRef]

50. Zare, M.; Azam, S.; Sauchyn, D. Simulation of Climate Change Impacts on Crop Yield in the Saskatchewan Grain Belt Using an Improved SWAT Model. *Agriculture* **2023**, *13*, 2102. [CrossRef]

51. Cao, Y.; Liu, J. The Spatial Spillover Effect and Its Impact on Tourism Development in a Megacity in China. *Sustainability* **2022**, *14*, 9188. [CrossRef]

52. Zeng, Z.; Wang, X. Spatial Effects of Domestic Tourism on Urban-Rural Income Inequality. *Sustainability* **2021**, *13*, 9394. [CrossRef]

53. Weaver, D. *Sustainable Tourism*; Routledge: London, UK, 2007.

54. Ammirato, S.; Felicetti, A.M.; Raso, C.; Pansera, B.A.; Violi, A. Agritourism and Sustainability: What We Can Learn from a Systematic Literature Review. *Sustainability* **2020**, *12*, 9575. [CrossRef]

55. Cheteni, P.; Umejesi, I. Evaluating the sustainability of agritourism in the wild coast region of South Africa. *Cogent Econ. Financ.* **2023**, *11*, 2163542. [CrossRef]

56. Mahaliyanaarachchi, R.P.; Elapata, M.S.; Esham, M.; Madhuwanthi, B.C.H. Agritourism as a sustainable adaptation option for climate change. *Open Agric.* **2019**, *4*, 737–742. [CrossRef]

57. Matei, F.D. Study on the evolution of seasonality in agritourism by regions of Romania. *Rom. Econ. J.* **2015**, *18*, 149–162.

58. Obadić, A.; Pehar, L. Employment, capital and seasonality in selected Mediterranean countries. *Zagreb Int. Rev. Econ. Bus.* **2016**, *19*, 43–58. [CrossRef]

59. Sousa, M.; Tomé, A.M.; Moreira, J. Long-term forecasting of hourly retail customer flow on intermittent time series with multiple seasonality. *Data Sci. Manag.* **2022**, *5*, 137–148. [CrossRef]

60. McElroy, T.S.; Monsell, B.C.; Hutchinson, R.J. Modeling of holiday effects and seasonality in daily time series. *Statistics* **2018**, *1*, 1–27.

61. Ferrante, M.; Magno, G.L.L.; De Cantis, S. Measuring tourism seasonality across European countries. *Tour. Manag.* **2018**, *68*, 220–235. [CrossRef]

62. Ćorluka, G.; Vukušić, A.; Kelić, I. Measuring tourism seasonality: Application and comparison of different methods. In Proceedings of the Faculty of Tourism and Hospitality Management in Opatija, Biennial International Congress, Tourism & Hospitality Industry, Opatija, Croatia, 26–27 April 2018; pp. 55–63.

63. Þórhallsdóttir, G.; Ólafsson, R. A method to analyse seasonality in the distribution of tourists in Iceland. *J. Outdoor Recreat. Tour.* **2017**, *19*, 17–24. [CrossRef]

64. Suštar, N.; Ažić, M.L. Measuring tourism seasonality across selected Mediterranean countries. *KnE Soc. Sci.* **2020**, 216–229. [CrossRef]

65. Signorell, A.; Aho, K.; Alfons, A.; Anderegg, N.; Aragon, T.; Arppe, A.; Baddeley, A.; Barton, K.; Bolker, B.; Borchers, H.W. DescTools: Tools for descriptive statistics. *R Package Version 0.99* **2019**, *28*, 17.

66. Cleveland, R.B.; Cleveland, W.S.; McRae, J.E.; Terpenning, I. STL: A seasonal-trend decomposition. *J. Off. Stat* **1990**, *6*, 3–73.

67. Romanian Presidency. Geographical Facts. Available online: https://www.presidency.ro/en/president/romania (accessed on 23 November 2023).

68. Ministry of Economy Entrepreneurship and Tourism. Accommodation Units. Available online: https://turism.gov.ro/web/autorizare-turism/ (accessed on 26 November 2023).

69. Popescu, G.; Popescu, C.A.; Iancu, T.; Brad, I.; Peţ, E.; Adamov, T.; Ciolac, R. Sustainability through Rural Tourism in Moieciu Area-Development Analysis and Future Proposals. *Sustainability* **2022**, *14*, 4221. [CrossRef]

70. Ciolac, R.; Iancu, T.; Popescu, G.; Adamov, T.; Feher, A.; Stanciu, S. Smart Tourist Village—An Entrepreneurial Necessity for Maramures Rural Area. *Sustainability* **2022**, *14*, 8914. [CrossRef]

71. Hyndman, R.J.; Athanasopoulos, G. Forecasting: Principles and Practice; OTexts: 2018. Available online: https://otexts.com/fpp3/ (accessed on 17 November 2023).

72. Duan, Q.; Wei, X.; Gao, Y.; Zhou, F. Base station traffic prediction based on STL-LSTM networks. In Proceedings of the 2018 24th Asia-Pacific Conference on Communications (APCC), Ningbo, China, 12–14 November 2018; pp. 407–412.

73. Sohrabbeig, A.; Ardakanian, O.; Musilek, P. Decompose and Conquer: Time Series Forecasting with Multiseasonal Trend Decomposition Using Loess. *Forecasting* **2023**, *5*, 684–696. [CrossRef]

74. Adil, M.; Wu, J.-Z.; Chakrabortty, R.K.; Alahmadi, A.; Ansari, M.F.; Ryan, M.J. Attention-based STL-BiLSTM network to forecast tourist arrival. *Processes* **2021**, *9*, 1759. [CrossRef]

75. Zhang, Y.; Li, G.; Muskat, B.; Law, R. Tourism demand forecasting: A decomposed deep learning approach. *J. Travel Res.* **2021**, *60*, 981–997. [CrossRef]

76. Kastenholz, E.; Lopes de Almeida, A. Seasonality in rural tourism—The case of North Portugal. *Tour. Rev.* **2008**, *63*, 5–15. [CrossRef]

77. Li, X. Seasonality of rural tourism: A comparative analysis of 33 cities in China. *Tour. Geogr.* **2023**, *25*, 1359–1383. [CrossRef]

78. Rusu, R.; Dezsi, Ș.; Dolean, B.E.; Man, T.; Moldovan, C. The Natural Potential as a Premise for the Development of Tourism in Sălaj County, Romania. *Stud. Univ. Babeș-Bolyai Geogr.* **2020**, *65*, 69–86. [CrossRef]

79. Rusu, R.; Dezsi, Ș.; Dolean, B.E.; Man, T.; Moldovan, C. The Anthropogenic Heritage as a Premise for the Development of Tourism in Sălaj County. *Stud. Univ. Babeș-Bolyai Geogr.* **2021**, *66*, 95–112. [CrossRef]

80. Ghidouche ait-yahia, K.; Lamia, N.; Ghidouche, F. Achieving sustainable development goals through agritourism in Algeria. *Worldw. Hosp. Tour. Themes* **2021**, *13*, 63–80. [CrossRef]

81. Karampela, S.; Kizos, T. Agritourism and local development: Evidence from two case studies in Greece. *Int. J. Tour. Res.* **2018**, *20*, 566–577. [CrossRef]