



Analysis on Spatial Distribution Characteristics and Causes of Homestay: A Case Study of Zhejiang Province, China

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Abstract

Homestay industry has become an important form of rural tourism in China and plays a key role in promoting China's rural revitalization plan. Taking Zhejiang Province, the most mature area of homestay development in China, as an example, this paper firstly obtains location information of homestays in 2019 by using web crawler technology. After analyzing the spatial distribution characteristics of homestays by the methods of nearest neighbor distance method and kernel density analysis, the intercity and intracity influencing factors are respectively identified using Geo-Detector method and gravity model analysis. The results reveal there exist significant spatial agglomeration characteristics in homestays development in Zhejiang Province. According to the multi-core cluster and single-core peripheral spatial distribution patterns, homestays are concentrated in the northern cities, such as Hangzhou City, Huzhou City, and Jiaxing City. In terms of intracity influencing factors, tourism resources endowment, tourism market conditions, and tourism policy environment play essential roles in the spatial structure of homestays in Zhejiang Province. The effect of multiple factors is more obvious than any single factor, proving the complexity and synthesis of spatial distribution of homestays. As the intercity influencing factor, the intensity of tourism economic connection among cities is also correlated with the spatial distribution of homestays. The findings offer both theoretical construct and policy recommendations for homestay industry and tourism planning.

Keywords: Homestays, Spatial Distribution, Influencing Factors, Geo-Detector, Zhejiang Province

Introduction

Homestay is an important part of the global non-standard accommodation industry and has been an important part of the world's tourism development research. As a different type of tourism from city hotels, its distribution characteristics and genetic mechanism also have significant local characteristics. In China, the homestay development is not only a form of business, but also a key driving force for the upgrading of urban and rural tourism and even rural revitalization, which is different from the single and decentralized layout of other countries. The

homestay development in China is characterized by of general agglomeration layout of accommodation industry, and is also affected by significant policy and culture. The distribution of different types of homestay in different regions features unprecedented complex interaction. As an important form of rural tourism, the homestay industry is a breakthrough point for rural revitalization, a bridge for the interaction and integration of urban and rural resources, a new starting point for promoting agricultural supply-side structural reform, and a new platform for promoting cultural interaction and exchanges [1]. The COVID-19 epidemic has led a change in the tourism development mode and consumer behavior. The new homestay consumption focus on not only accommodation products, but also the value-added experience brought by the rural environment and products. The homestay industry has developed from tourism "industry branch" to "independent industry", from "dependent scenic spot" to "self-formed system", from "accommodation space" to "scene platform", and from "scattered distribution" to "agglomeration group". The trend of homestay agglomeration development has become increasingly obvious [2-3].

Previous studies on the spatial distribution of homestay have focused on the spatial infiltration, agglomeration and expansion of homestay [4-7]. According to research findings, In terms of site selection, the accommodation industry tends to actively seek agglomeration effect with the homestay dominating in urban centers and hotels dominating in urban peripheries [8-10]. Homestays represented by Airbnb are closely related to tourist attractions and are distributed along major transportation routes [11,12]. In terms of spatial form, there are many types, such as multi-core group shape, multi-center level layer shape and multiple agglomeration state [15], and the interaction and cooperation of related industries caused by the agglomeration of geographical space is the key to deeply understand the internal mechanism of spatial distribution of homestay [13-15]. The surrounding environmental factors, including entertainment places, park green space, and shopping facilities, are also important factors affecting the distribution of homestay [16]. Homestay agglomeration are distributed around economically developed cities and core scenic spots, forming density centers of homestay agglomeration [17]. The process of spatial

agglomeration is closely related to topography, core scenic spots, traffic arteries and residential areas [18]. The researches on the accommodation industry layout have been carried out from economics and geography using central place theory, location theory and agglomeration theory, and have experienced from qualitative research to quantitative research supported by the geographic information, visualization and digital footprint, with the research object being continuously refined and the content being increasingly enriched [19-22]. Transportation conditions, tourism resources, infrastructure, economic development level, investment and agglomeration effect are main factors of the spatial layout of the accommodation industry [11].

To sum up, the research on homestay started late but developed fast, and at the same time, there still exist certain limitations [23-27]. In recent years, researches on the spatial agglomeration of homestay in China mainly focus on a village, city or specific region, relatively few researches on provinces. Since homestay development is closely related to provincial policies, it is important to conduct relevant studies. Taking the provincial area as the re-search object, besides the city's own resources, the economic connection among cities is also an important factor affecting the homestay distribution, so it is necessary to strengthen the research on the interactive development among cities. The developed private capital and the high online penetration rate under the digital economy provide the premise and support for the homestay development in Zhejiang Province, and the investment in homestay has become a new way for farmers to get rich in Zhejiang Province [28]. The attention of local governments and the role of the early established homestay industry association also paved the way for the homestay development. Due to the active regional economic growth and complete infrastructure in Zhejiang Province, the good tourism conditions and cultural environment provide a foundation for the homestay development [29]. In Zhejiang Province, low-end homestays have begun to transform to the middle and high-end homestays with themes and features, and related supporting service centers have been established. A series of high-quality homestays, represented by homestays of Chun'an in Hangzhou City and Anji in Huzhou City, have been formed in Zhejiang Province. And the area around Moganshan has become one of the most important homestay agglomeration areas in China by virtue of its strong brand agglomeration effect [13].

This paper takes the homestay in Zhejiang Province of China as an example to study the spatial distribution and causes of homestay, summarize rules and guide practice. The main research objectives include: (1) to summarize the characteristics of spatial distribution of homestay in Zhejiang Province; (2) to explore the internal and external factors affecting spatial distribution of homestay in Zhejiang Province; (3) to provide a basis for judging the trend of tourism consumption and optimizing functional zoning by analyzing the regional agglomeration differences of homestay. This is an innovative attempt to understand and supplement the basic theoretical research on the layout patterns and genetic mechanism of homestay.

Data sources and research methods

Overview of the study area

The research area is mainly Zhejiang Province in China, with a total area of 105,500 square kilometers and jurisdiction over 11 cities, including Hangzhou, Ningbo, Wenzhou, Huzhou, Jiaxing, Shaoxing, Jinhua, Quzhou, Zhoushan, Taizhou, and Lishui. This area is represented by scenic spots, ancient town homestays and island homestays, forming high-quality homestay agglomeration, which is the most mature typical example of homestay development in China [30]. At the same

time, the formation of homestay agglomeration is related to local factors such as regional economic advantages, transportation, rural modernization, distinctive resources. The good economic and cultural environment has laid a solid foundation for the agglomeration of homestay industry. Therefore, taking homestay in Zhejiang Province as an example, which is typical and representative, this paper analyzes the spatial distribution characteristics and influencing factors.

The data source

The homestay studied in this paper refers to a place that provides tourists with leisure accommodation and related living services by use of self-use or rented vacant residential rooms, combining local natural and cultural landscape, ecological environment resources and production activities including agriculture, forestry, fishery and husbandry. In view of that tourism industry is highly affected by COVID-19 in 2020 and 2021, abnormal years for tourism development, 2019 is chosen as the data base year for the study. The related data as of December 31, 2019, mainly comes from the homestay channel of Trip.com with a high number of visits and good evaluation. The homestay data is 17333 in total, collected by web crawler technology including the name, address, number of rooms, price, opening time, tourist number and comment and excluding information of chain hotels, city apartments and youth hostels. Based on the Statistical Yearbook of Zhejiang Province, the statistical bulletin of relevant cities and government work reports, this paper summarizes relevant influencing factors and data, and analyzes the influence of various factors on the distribution of homestays.

Research Methods

Nearest neighbor distance method

The nearest neighbor distance indicates the mutual proximity of the dotted elements in a region [31]. This paper uses the model of the nearest neighbor distance to calculate the type of spatial distribution of homestays in Zhejiang Province. Firstly, the calculation of the actual nearest-neighbor distance. The distance between each homestay and the adjacent point is r , and the average of that distance is R_i , which is the actual nearest adjacent distance. Secondly, the calculation of the theoretical nearest neighbor distance. When the dot distribution in the region is random, the theoretical value of the nearest neighbor distance is R_E . Finally, the nearest point index R is calculated.

$$R_n = \frac{\bar{d}}{R_E}$$

$$\bar{d} = \frac{\sum d}{n}$$

$$R_E = \frac{1}{2\sqrt{n/A}}$$

n is the number of point elements; A is the area of the studied region. When $R=1$, the actual nearest distance is equal to the theoretical nearest distance, indicating its spatial structure is random; when $R>1$, the actual nearest distance is greater than the theoretical nearest distance, indicating its spatial structure is homogeneous; when $R<1$, the actual nearest distance is less than the theoretical nearest distance, indicating its spatial structure is cohesive.

Kernel density analysis method

This paper mainly uses ArcGIS software to conduct spatial visual analysis of statistical data, and analyzes the spatial distribution characteristics of regional homestay agglomeration areas. Density analysis is to calculate the data aggregation of the whole area according to the input element data. Through density analysis, the measured points or lines can be generated into continuous surfaces to identify the agglomeration area of spatial elements; in particular, kernel density estimation can present the calculation more smoothly based on the weight of the points in the search area.

$$\hat{f}(x) = \frac{1}{nh^d} \sum_{i=1}^n K \left[\frac{h}{h} (x - x_i) \right]$$

K [] is the kernel function, h is the bandwidth, n is the number of known points within the bandwidth range, and d is the dimension of the data.

Geo-Detector

Geo-Detector (GD) is an econometric method to explore spatial differentiation and explain the driving forces behind and an important method to detect the causes and mechanisms of spatial pattern of geographical elements [32]. The factor detector is used to test whether a certain geographical factor is the cause of the spatial distribution difference of a certain index value, specifically by comparing the total variance of this index in different category zones with its total variance over the whole research area. The model is as follows:

$$q = 1 - \frac{\sum_{h=1}^L N_h \sigma_h^2}{N \sigma^2} = 1 - \frac{SSW}{SST}$$

$$SSW = \sum_{h=1}^L N_h \sigma_h^2, SST = N \sigma^2$$

In the formula: h=1,2,3,...; L is the stratification of Y and X; N_h and N are the number of cells in layer h and the whole region respectively; σ_h² and σ² are the variance of the Y values of layer h and the whole region respectively; SSW and SST are the sum of the variance and the total variance of the whole region respectively. The spatial differentiation of Y detected by GD and the extent to detecting a factor X explains the spatial differentiation of attribute Y, measured by q-values. The value domain of q is [0,1], and a larger value indicates a stronger spatial specificity of Y; if the stratification is generated by the independent variable X, a larger q-value indicates a stronger explanatory power of the independent variable X for attribute Y, and vice versa.

Gravity model analysis

There are various flows of material, information, capital, tourism and so on among cities, which is constantly exchanged and transferred, and the relationship among them largely depends on the traffic distance between cities [33]. Therefore, Newton's law of gravity is introduced to study the issues of cities, tourism and so on [34-37]. In this paper, the gravity model is modified to estimate the tourism economic relationship between cities. Formula is:

$$R_{ij} = \frac{\sqrt{P_i V_i} \sqrt{P_j V_j}}{D_{ij}^2}$$

R_{ij} is the tourism economic connection of cities I and J; P_i, P_j and V_i, V_j are the total number of tourists received (unit: ten thousand person-times) and the total income of tourism (unit: hundred million yuan) by city i and j respectively. D_{ij} is the highway traffic distance from city i to city j. The tourism economic connection of the city C_i is the sum of the tourism economic connection of city i and all other cities within the region. That is C_i = ΣR_{ij}.

Results

3.1 Spatial distribution characteristics of homestay

(1) Homestays in Zhejiang Province are characterized by agglomeration development, When R=0.169<1, it indicates that the homestays in Zhejiang Province are in spatial agglomeration distribution by spatial nearest neighbor distance analysis and calculation. And the calculated Z=-149.58, with P 0.00, indicates agglomeration is extremely significant.

(2) The distribution of homestays in Zhejiang Province is mainly concentrated in the northern cities, showing the characteristics of multi-core cluster and single-core peripheral decreasing distribution. The positioning analysis and kernel density calculation of homestays in Zhejiang Province show (Figure. 1) that the density (Figure. 2) of homestays in Zhejiang Province is concentrated in Hangzhou, Huzhou, Jiaxing and Zhoushan cities as the first-level cluster core, and Ningbo, Jinhua and Taizhou cities as the second-level cluster core. Zhoushan and Hangzhou cities respectively accounts for 37.29% and 24.05% of the total number of homestay facilities in Zhejiang Province. Other cities also show a trend of agglomeration development.

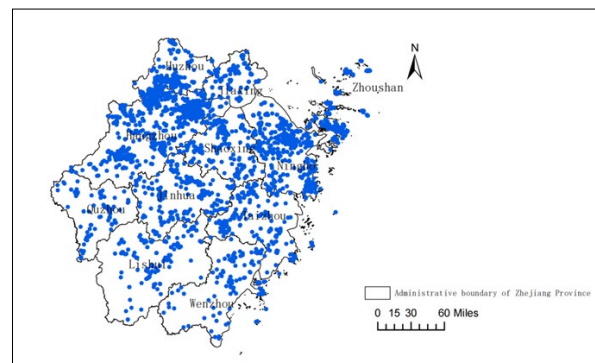


Figure 1: Spatial distribution of homestays in Zhejiang Province

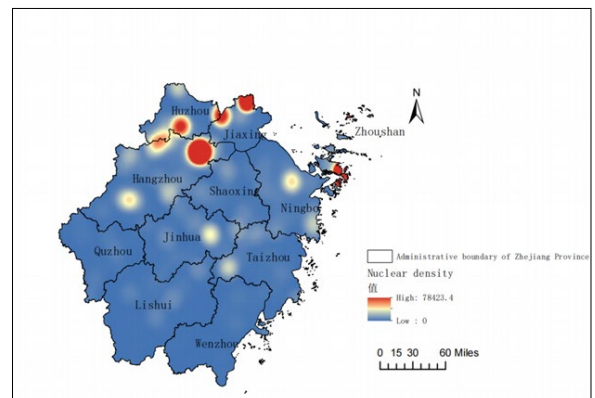


Figure 2: Kernel density calculation of homestays in Zhejiang Province

Homestays in Zhejiang Province show different characteristics with circular distribution and plate-shaped distribution around cluster core. For example, the Moganshan homestay is mainly distributed in a ring with the Moganshan scenic spot as the core, and the homestay near the West Lake in Hangzhou City is distributed in a patchwork with the West Lake scenic spot, forming a homestay agglomeration. The homestays in Zhejiang Province include in agglomerations with lakes, rivers, oceans and other water tourism resources as important support, such as Zhoushan homestay agglomeration, Qiandao Lake homestay agglomeration and Fuchun River homestay agglomeration; homestay agglomerations with mountain-type tourism resources as main support, such as Tiantai Mountain homestay agglomeration and Wenling homestay agglomeration; homestay agglomerations with traditional ancient towns and villages as main support, such as Songyang homestay agglomeration; homestay agglomerations with humanistic landscape as main support, such as Shaoxing homestay agglomeration and Dongyang homestay agglomeration (Figure 3). Many homestays are supported by complex resources including water, mountain and traditional ancient villages of tourism resources, which is the result of various factors together to form regional comprehensive competitive advantages.

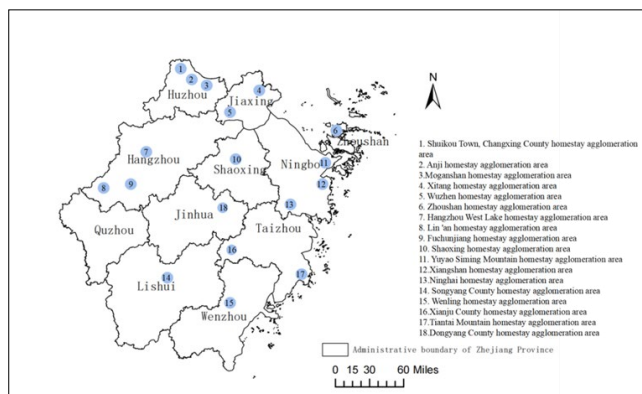


Figure 3: Distribution of homestay agglomeration in Zhejiang Province

Equilibrium of spatial distribution of homestays

According to the centralized distribution and uniform distribution data of homestays in Zhejiang Province, the Lorenz curve of the distribution of homestay in each city is drawn. The curve has typical concave characteristics (Figure 4), indicating the distribution of homestay in Zhejiang Province is uneven, and the number of homestays owned by only two cities, Hangzhou City and Zhoushan City exceeds more than 60% of the total number of homestays in the whole province. Hangzhou City is a famous tourist city in China with rich tourism resources and diverse types of tourism. The rich tourism resources have laid the foundation for the local homestay development. Homestay operators can rely on the rich tourism resources, and fully explore Hangzhou City’s cultural characteristics to promote the development of the homestay industry. Zhoushan City, an archipelago-type city with pleasant climate, unique marine geographic location, rich island tourism resources, special seafood cuisine and one of four famous Buddhist holy sites Putuo Mountain, which are important foundations for homestay development, has gathered a large number of well-known and influential homestays.

In order to accurately reflect the characteristics of the spatial distribution of homestays in Zhejiang Province, the Gini coefficient (G) and the distribution uniformity $C = 1 - G$ are quoted in this paper. The calculated $G = 0.755$ and $C = 0.245$

indicate that the homestay in Zhejiang Province has the characteristics of agglomeration distribution and low uniformity distribution.

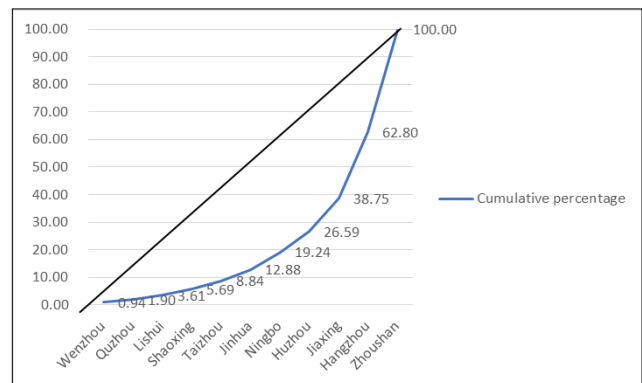


Figure 4: Lorenz curve of the homestay distribution in Zhejiang Province

Analysis of influencing factors of the spatial distribution of homestay

Many scholars have discussed the influencing factors of the spatial distribution of homestays, and studies have shown that the spatial characteristics of homestay are jointly influenced by various factors such as basic conditions, economic environment, resource endowment and national policies, etc [38-40]. With reference to the relevant research results, combined with tourism development and the spatial distribution of homestay in Zhejiang Province, this study considers that tourism resource endowment, tourism market conditions, and tourism policy have important impacts on the spatial structure of the homestay distribution in Zhejiang Province. Natural and humanistic tourism resource endowment are the foundation of homestay development. The areas with rich tourism resources and high level are chose first for de-veloping homestays. With the development of China’s economy and the advent of mass tourism, tourism market conditions have become an important driving force for the rapid development of homestays: the population size of tourist destinations is the basis of guest source of homestays; the convenient transportation brings the distance between tourist sources and homestays closer; the development of social and economic conditions in tourist destinations pro-motes the construction of hardware facilities and services of homestays. As the leading force of regional economic development, the government plays an important role in formulating regional tourism development plans, making homestay industry support policies, coordinating and maintaining daily management. Based on this, this paper con-structs the influence index of the spatial distribution of homestay in Zhejiang Province (Table 1).

Table1: Influencing factors and its decisive force of the spatial distribution of homestay

Level 1 indicators	Level 2 indicators	Evaluation indicators	q value
Tourism resource endowment	Nature tourist re-source X1	Number of World Natural Heritage sites, number of National Forest Parks, number of National Geopark, number of National Nature Reserves, number of National Park of China, number of A-level tourist attraction	0.6759*
	human tourist re-source X2	number of World Cultural Heritage Sites, number of State-level Cultural Relic Protection Units, number of Traditional Chinese Ancient Villages, number of museums and memorials, number of A-level tourist attraction	0.8087*
Tourism market conditions	Social and economic condition	GDP X3	0.9229**
	Tourism market de-mand	total number of tourists X4	0.7515*
	Customer market potential	number of resident population X5	0.5374*
		per capita disposable income X6	0.7644**
	Tourism market size	tourism income X7	0.7516*
Traffic conditions in tourist destinations	highway mileage at the end of the year X8	0.9357**	
Tourism policy environment	regional develop-ment planning and industrial support policies	the number of tourism and homestay mentioned in the government's annual work report X9	0.3675*

Note: ***, ** and * are significant at 1%, 5% and 10% levels respectively

Tourism Resource Endowment

The intracity influencing factors of homestay spatial distribution

Parks, National Nature Reserves, National Scenic Area and A-level tourist attractions are used to characterize the city's natural tourism resources endowment. The number of World Cultural Heritage Sites, National Cultural Relics Protection Units, China's Famous Historical and Cultural Cities, China's traditional villages, museums, memorial halls and A-level tourist attractions are used to characterize the city's humanistic tourism resources endowment (Table 1). The correlation analysis of the tourism resource endowment and the number of homestays in Zhejiang Province by Geo-Detector shows the natural tourism resources is $q=0.6759$ and the humanistic tourism correlation $q=0.8087$, indicating there is a significant positive correlation between above two indexes, and humanistic tourism resources are more decisive to the spatial distribution of homestay. The northern part of Zhejiang Province has the scenery of ancient water towns in southern Yangtze River, with famous attractions such as West Lake, Nanxun ancient town, Wuzhen ancient town and Xitang ancient town. The southern part is dominated by hilly landscapes, such as Yandang Mountain, Shenxianju, and Jianglang Mountain in Quzhou City. Zhejiang Province has 638 Chinese ancient villages, 256 National Cultural Relics Protection Units, 748 A-level tourist attractions, 42 National Forest Park, 22 National Scenic Areas, 18 AAAAAA tourist attractions. The large-scale and high quality tourism resources and rich cultural heritage have created a good environment for homestay development, which is the basis for the booming development of homestay industry.

Tourism market conditions

The GDP, the total number of tourists, permanent population, per capita disposable income, tourism income, road mileage at the end of the year can reflect a city's social and economic conditions, tourism demand, tourist source market potential, tourism market size and tourism traffic condition to a certain extent. Therefore, this paper adopts indexes including GDP, the total number of tourists, permanent population, per capita disposable income, tourism income and road mileage at the end of the year to represent the tourism market conditions of each city, analyzes their determination forces by Geo-Detector,

and then obtains that tourism market conditions are positively correlated with the homestay spatial distribution. That is, the social and economic conditions ($q=0.9229$), tourism demand ($q=0.7515$), tourist sources market potential ($q=0.5374$), tourism market size ($q=0.7644$) and tourism traffic condition ($q=0.9357$) have a certain impact on the spatial distribution of homestays in Zhejiang Province.

(1) Social and economic conditions, good social and economic conditions are the basis for the tourism industry development, which directly affects the scale and location of homestays, and are important factor influencing the spatial distribution of homestay. The q value of GDP (0.9229) indicates that GDP has a strong determinant effect on the spatial distribution of homestay. The GDP of Zhejiang Province has been ranked in the top five in China for many years, and the GDP of Hangzhou City is among the top ten cities in China. The over level of regional economy development is the basic condition of homestay de-velopment, affecting infrastructure (including tourist traffic conditions), and tourism and leisure resort facilities on which the tourism and the homestay rely for survival and development. At the same time, the living level of residents influences tourism demand and tourism forms, determining the construction and development of homestay. The strong economic development lays the foundation for the growth of homestay, and homestay industry can drive the devel-opment of tourism-related industrial chains, and promote economic and social development.

(2) The q value of the total number of tourists (0.7515) shows that the tourism market demand is strong in determining the spatial structure of homestays. According to Perroux's growth pole theory, the flow of economic factors occurs under non-equilibrium conditions, and growth occurs first at some growth poles with different intensity. The growth pole is the spatial agglomeration of propulsive industries and their related industries. The homestay development meets the demands of personalized tourism, and the upgrading of tourism consumption promotes homestay industry. They promote each other.

(3) The q values of resident population (0.5374) and per capita disposable income (0.7644) of tourist places show that population size or density is the basic condition for the

development of tourism market, and the market potential of the resident population of tourist places affects the spatial structure of homestay. The high per capita disposable income provides the material foundation for leisure tourism, which determines that the consumption power of homestays in Zhejiang Province will be relatively strong. The homestay development depends largely on local and surrounding tourism markets, and the source market of homestay is dominated by urban residents within a 2-hour traffic radius, so homestays is bound to develop in and around cities with large population density as a priority. In addition to the local resident population, the large population base of the Yangtze River Delta also provides a rich source of tourists in Zhejiang Province.

(4) The q value of tourism income is 0.7516. Tourism income reflects the basic situation and the efficiency of regional tourism development. The higher the tourism income, the higher the tourism benefit. As an important component of tourism accommodation, the development of homestay is bound to be affected by the efficiency of regional tourism development. The higher the tourism income, the more obvious the homestay agglomeration. Zhoushan City is relatively small in area, but its tourism income per unit area is 73.236 million yuan/square kilometer, higher than Hang-zhou Ctiy’s 23.77 million yuan/square kilometer, and it has the largest number of homestays.

(5) The q value of the traffic conditions (0.9357) indicates that the traffic conditions of tourist places have a strong determinant effect on the spatial distribution of homestays. Transportation accessibility is an important condition that affects homestay industry, especially the rise of self-driving travel, which greatly promotes regional tourism industry. Convenient transportation conditions connect tourist attractions and homestays, and homestays are more densely distributed in areas with good traffic access.

Tourism policy environment

The calculation results of the Geo-Detector show that the tourism policy environment has a positive influence on the spatial distribution of homestays, but the determining power is not strong($q=0.3675^*$). The tourism development is mentioned in the governments work reports in Zhejiang Province, with Lishui City (15 times), Huzhou City (11 times), Shaoxing City (10 times) mentioning tourism more than 10 times and Hangzhou City, Wenzhou City, Quzhou City and Lishui City also mentioning homestays. Zhejiang Province is at the forefront of the whole country with many policies on homestay development, having introduced “The Guidelines of the People’s Government of Zhejiang Province on Determining the Scope and Conditions of Homestays”, and the local standard of “Basic Requirements and Evaluation of Homestays (DB 33/T 2048-2017)” was formulated as early as 2017. Many cities have also issued a lot of guidelines to regulate homestay industry. For example, Hangzhou City issued “The Guidelines on Further Optimizing Services to Promote the Standardized Development of the Rural Homestay Industry”, and Ningbo City issued “The Opinions on Accelerating the Economic Development of Homestays and Promoting the Deep Integration of Agriculture, Tourism and Culture”. The formulation of a series of policies has provided an institutional guarantee and sustainable impetus for the industrial standard development, quality and efficiency improvement.

Interaction results and analysis of factors

The interaction detector was used to detect the 9 independent variables in pairs. Due to too many double factor combinations,

only the top 10 results in the ranking of explanatory power after interaction were counted: $X2 \cap X4$ (0.9883), $X2 \cap X5$ (0.9883), $X3 \cap X4$ (0.9883), $X6 \cap X4$ (0.9883, $X9 \cap X7$ (0.9883, $X9 \cap X3$ (0.9883, $X7 \cap X6$ (0.9883, $X7 \cap X3$ (0.9766, $X6 \cap X3$ (0.9229 and $X1 \cap X9$ (0.8131). The analysis found that the explanatory power of any group of two-factor interaction over the spatial differentiation of homestays in Zhejiang Province was greater than single factor, and the interaction type is nonlinear enhancement. The interaction between factors can explain the spatial differentiation of homestays to over 90%, proving that the spatial distribution difference of homestay is not caused by a single influencing factor, but by the interaction of multiple factors to form the existing unique spatial pattern.

The homestay development in Zhejiang Province has gone through from the embryonic stage, to the rapid development stage and then to mature development stage. The embryonic stage is characterized by the relatively short time of homestay operation; the small proportion of homestay operation in the whole region scope, which has not formed scale effect; and simple food and accommodation offered by homestays; and the low proportion of homestay tourism income in the whole region. The rapid development stage is characterized by the development of homestay industry gradually forming a scale and attracting a large number of tourists; Homestays begin to stratify in grade and form characteristic operation; and homestay tourism products are diversified. The mature development stage is characterized by that the homestay industry becoming the leading industry in the region; the homestay agglomeration has a market size and brand awareness; a certain characteristic industrial chain; enterprises are highly organized and the industrial division of labor is clear in the industrial agglomeration area, and management is increasingly specialized.

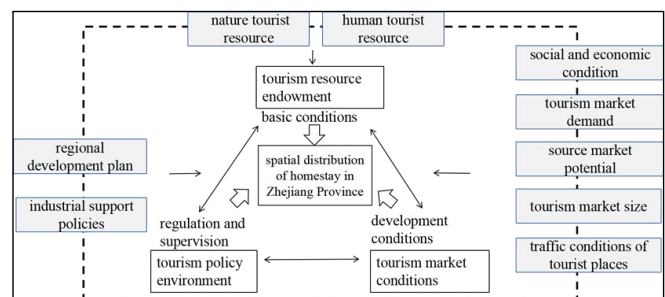


Figure 5: Mechanism analysis of the spatial differentiation of homestay in Zhejiang Province

The intensity of tourism economic connection

In order to more accurately understand the impact of the intensity of tourism economic connection among cities in Zhejiang Province on the spatial distribution of homestays, so as to better achieve the overall development of regional homestay industry, this paper uses the formula of modified gravity model to measure the intensity and total amount of tourism economic connection among 11 cities in the region. As can be seen from Table 2 and Table 3: Hangzhou City and other 10 cities maintain a high tourism economic connection, presenting a continuous attenuation tendency from north to south. Hangzhou City, Huzhou City, Jiaxing City, Shaoxing City, Ningbo City in the northern Zhejiang Province closely interconnected, while the cities in the southern Zhejiang Province show relatively weak correlation. Hence, the homestays distributed in the northern area are relatively more than the southern area, similar to the characteristics of spatial distribution of homestays. Except for Hangzhou City, there is little difference in the total tourism economic connection among cities in Zhejiang Province.

Hangzhou City (38.75%) accounts for almost 40% of the total tourism economic connection in Zhejiang Province with obvious homestay agglomeration characteristic. Therefore, in Zhejiang

Province, the intensity of tourism economic connection among cities is correlated with the spatial distribution of homestay.

Table 2: The tourism economic correlation of Zhejiang Province urban agglomeration in 2019

City	Hangzhou	Ningbo	Wenzhou	Shaoxing	Huzhou	Jiaxing	Jinhua	Quzhou	Zhoushan	Taizhou	Lishui
Hangzhou	/	2132.20	454.63	1194.69	4787.90	4894.03	1389.31	390.49	488.77	561.84	333.52
Ningbo	2132.20	/	376.46	1551.65	419.00	917.48	452.35	121.47	1856.64	832.11	167.03
Wenzhou	454.63	376.46	/	210.99	123.60	139.42	460.80	116.61	99.73	1313.96	670.57
Shaoxing	1194.69	1551.65	210.99	/	811.32	1490.86	655.34	138.44	295.94	388.58	173.47
Huzhou	4787.90	419.00	123.60	811.32	/	2723.39	303.88	108.40	129.35	157.09	91.67
Jiaxing	4894.03	917.48	139.42	1490.86	2723.39	/	342.50	88.81	227.42	227.99	95.77
Jinhua	1389.31	452.35	460.80	655.34	303.88	342.50	/	1184.96	121.94	447.65	855.01
Quzhou	390.49	121.47	116.61	138.44	108.40	88.81	1184.96	/	36.81	102.28	152.30
Zhoushan	488.77	1856.64	99.73	295.94	129.35	227.42	121.94	36.81	/	170.74	48.70
Taizhou	561.84	832.11	1313.96	388.58	157.09	227.99	447.65	102.28	170.74	/	237.52
Lishui	333.52	167.03	670.57	173.47	91.67	95.77	855.01	152.30	48.70	237.52	/

Table 3: The tourism economic aggregation of Zhejiang Province in 2019

City	Hangzhou	Ningbo	Wenzhou	Shaoxing	Huzhou	Jiaxing	Jinhua	Quzhou	Zhoushan	Taizhou	Lishui
Ri	27379.57	6694.20	3512.12	5716.58	4867.70	6253.62	4824.44	2050.08	2987.28	3877.91	2492.04
Rank	1	2	8	4	5	3	6	11	9	7	10
Pro-portion%	38.75	9.47	4.97	8.09	6.89	8.85	6.83	2.90	4.23	5.49	3.53

Conclusion and discussion

This paper use ArcGIS software to analyze the spatial distribution characteristics and influencing factors of homestays in Zhejiang Province through the analysis methods of the nearest neighbor distance index, gravity model and Geo-Detector. The conclusions are as follows: First, the homestays in Zhejiang Province is characterized by agglomeration development, and there are certain differences in the spatial distribution of homestays in different cities. Second, the homestays distribution in Zhejiang Province is mainly concentrated in the northern cities, and shows the characteristics of multi-core cluster and single-core peripheral decreasing distribution. Homestays in Hangzhou, Huzhou, Jiaxing and Zhoushan cities are relatively concentrated, while Quzhou City and Lishui City are relatively few. The distribution density of homestays varies greatly among cities. Third, tourism market conditions, tourism resource endowment and tourism policy environment are determinants on the spatial structure of homestays in Zhejiang Province, and social and economic conditions and traffic conditions of tourism market conditions are more decisive. The intensity of tourism economic connection among cities is correlated with the spatial distribution of homestay in Zhejiang Province. Fourth, the differences in the spatial distribution of homestay are unique spatial patterns formed under the interaction of multiple factors, not determined by a single factor. The research on spatial distribution and influencing factors of homestay can provide scientific support for rational layout and overall development of homestay industry. At the same time, Zhejiang Province is the most mature area for the homestays development in China. The study on the spatial pattern and influencing factors of homestays agglomeration can predict the homestay development in other areas and provide reference and guidance.

The homestay development in Zhejiang Province shows a rapid growth trend. With the support of high-quality resources, market conditions and tourism policies, the homestay

development shows a high-quality development trend, but there are still some problems. Firstly, the cooperation between cities needs to be strengthened. The homestay development depends on the flow of tourists between cities and can be provided new momentum by the optimization and integration of cross-city resources. Secondly, the radiative driving role of major cities still needs to be improved. At present, the high-density distribution of homestay is concentrated in the northern cities of Zhejiang Province, and the southern cities with rich rural tourism resources have huge space for homestay development. In the future, it is necessary to enhance the effective interaction among major tourist cities in Zhejiang Province and promote the integration of cross-city homestay resources by improving the radiation function. Thirdly, the development model of homestay needs to be innovated. With the increasing number of homestays, the competition is becoming increasingly fierce. At present, tourists' demand for diversified consumption and life-oriented experience is increasingly prominent, making homestay face more severe challenges. Homestay industry can extend the life cycle by marketing, enriching experience, expanding product systems and other methods.

This paper only studies the spatial distribution of homestays in Zhejiang Province based on the obtained data, reflecting the development of homestays at a certain time point, but the dynamic research on the spatial-temporal evolution mechanism of the spatial agglomeration of homestays in Zhejiang Province still needs to be further deepened. This paper only analyzes the economic connection between cities in Zhejiang Province. As Zhejiang Province is an important part of the Yangtze River Delta, the cities in Zhejiang Province are closely related to the cities in the Yangtze River Delta. The impact of the interaction between cities in the whole Yangtze River Delta on the development of homestay needs to be studied subsequently. In order to comprehensively reflect the overall distribution characteristics of homestays in Zhejiang Province, homestays are not divided

according to different types, and the influencing factors of urban and rural homestays are further strengthened. In addition, the influence of other factors on homestay agglomeration also needs to be further explored and verified, such as internet marketing. As a personalized accommodation product, homestays has been relying on internet marketing and promotion, which will make a place quickly gather a large number of internet celebrities of homestays. It will have a certain impact on the distribution of the homestay industry. In order to promote the healthy and orderly development of the homestay industry, relevant departments to strengthen the homestay industry planning, guide the reasonable layout and development will become a key research direction.

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