

## Article

# Spatial Differentiation and Impact Factors of Tourism Development: A Case Study of the Central Plains, China

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**Abstract:** This study aims to summarize the patterns of spatial differentiation and impact factors on tourism development. This research used the Central Plains as the study area to analyze the spatial differentiation patterns of tourism development from 2005 to 2018. The study used spatial econometric methods, such as the spatial Durbin model and the geodetector model, to explore the impact factors of tourism development. According to the results, the spatial differentiation characteristics of domestic tourism and inbound tourism were similar, and the spatial agglomeration of both had significantly narrowed. The study also found impact factors in the study have a differential influence on domestic tourism and inbound tourism, with a strong spatial spillover effect on domestic tourism compared to inbound tourism. For a long time, domestic tourism has been impacted mainly by tourism policies and economic levels, inbound tourism has been impacted by tourism policies, and the level of openness to the outside world does not have a major impact on inbound tourism. Reasonable explanations are provided for these results and policy implications are drawn.



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**Keywords:** tourism development; space differentiation; impact factors; spatial Durbin model; geodetector model; the Central Plains

## 1. Introduction

Entering the 21st century, China's tourism industry is developing rapidly. China has become one of the most popular destinations for inbound and outbound tourism [1] and is the third most visited destination country in the world [2]. According to the Chinese Ministry of Culture and Tourism (2019), the comprehensive contribution of China's tourism industry to GDP was CNY 9.94 trillion in 2018, accounting for 11.04% of GDP. Tourism has become one of the pillar industries of China. The Central Plains region is one of the key growth poles for China's economic development [3]. This region is rich in tourism resources, with 484 A-class tourist attractions, including 13 5A-class attractions and 142 4A-class attractions [4]. Tourism revenue accounts for 15% of GDP in the Central Plains, making tourism an important support for economic development [4]. Therefore, it is essential to study the impact factors and analyze the impact mechanisms, which are of great significance in promoting the development of tourism in the Central Plains. What is more, it also serves as a reference for policy formulation on tourism development in other regions after the end of the COVID-19 epidemic.

Due to regional differences in tourism resources, economic development levels, and location conditions, it is inevitable that there will be non-equalization of tourism economic development between regions [5]. Tourism development has a strong spatial dependency [6]. Between the 1990s and the beginning of the 21st century, the relative difference between provinces in China's tourism development gradually narrowed [7]. China's tourism industry shows a gradient between the east, the central, and the west, with the east being the highest, the central the second highest, and the west the lowest [6]. Due to differences in

regional economies, tourism resources, tourism infrastructure, and other conditions in east, central, west, and northeast China, tourism development in each region appears different characteristics. The tourism development of northeast China shows widening relative differences and shrinking absolute differences [8]. In contrast, the tourism development in Zhejiang Province of Southeast China has narrowed in relative differences and widened in absolute differences [9]. The tourism development of Anhui Province in central China is characterized by spatial agglomeration and widening spatial differences [10]. The spatial agglomeration of the tourism development in western China is not obvious and shows a balanced development [11].

Crouch G I introduced Porter M E's diamond theory [12] to the study of tourism competitiveness and proposed six important factors that affect the competitiveness of tourism in each region, namely social, economic, policy, individual, and cultural factors [13]. Following this, empirical research on tourism development began to flourish [14]. The development of tourism requires the cooperation of all stakeholders and is a process driven by multiple influencing factors [15]. In tourism development studies, some scholars have argued that tourism and regional economies have a mutually reinforcing effect [16,17]. The direction of causality between tourism and the economy depends on the country, and tourism in China is positively influenced by economic growth [18]. When the regional economy level increases, the regional inbound tourism development expands more than the domestic tourism development [19]. However, inbound tourism also plays an important role in promoting China's regional economic development [20]. The main impact factors on the regional tourism development are generally considered to be the level of the regional economy, tourist attractions, accommodation, tourism service level, and urban infrastructure [21–24]. As research into tourism development has deepened in recent years, some scholars have suggested that governmental and transport factors may play a more important role [25–28]. The amount of bilateral trade or the degree of globalization contributes more strongly to the flow of inbound tourism [29]. However, there is uncertainty about the improvement of inbound tourism development [30]. Foreign capital investment has the potential to have a negative effect on regional tourism development [31]. China's inbound tourism development has evolved from location-driven to policy-driven to market-driven from 1978 to 2005 [32]. Most Chinese scholars believe that inbound tourism development is mainly influenced by international trade, retail sales of goods, the level of the economy, the quality of tourism services, policies, and institutions, and the level of transportation [33,34]. There is little difference between the impact factors of inbound tourism and domestic tourism. Simultaneously, the impact of high-speed rail on inbound tourism development is greater than that of the domestic tourism development in China [35,36].

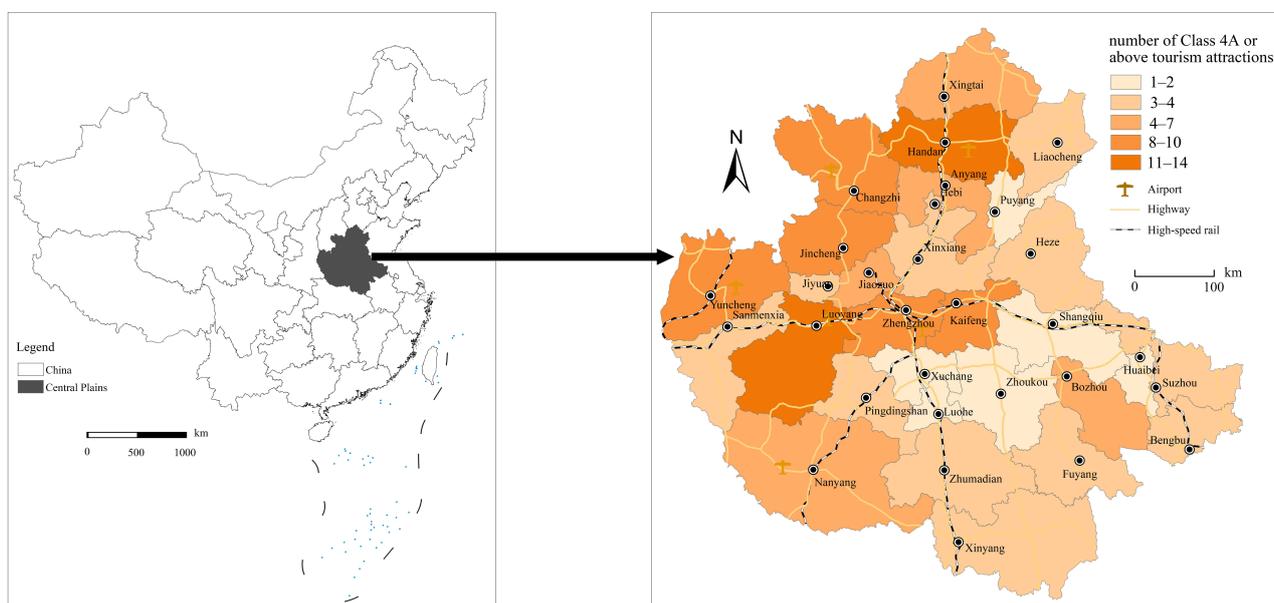
Scholars' research on tourism development is mostly based on the analysis of multiple impact factors in time cross-section or on the analysis of one impact factor in time periods. However, fewer studies have selected a time period to examine the changes in tourism development and its multiple impact factors. The analysis of a time period provides a more intuitive perspective on tourism development. Therefore, the rest of this article is organized as follows. The second section introduces the materials and methodology; the third section presents the spatial differentiation pattern of tourism development in the Central Plains and the calculation of the results of the impact factors from 2005 to 2018, which are explained and discussed in the fourth section; the last section contains the main conclusions and the theoretical and policy implications of the paper.

## 2. Materials and Methods

### 2.1. Study Area

The Central Plains region is one of the key growth poles for China's economic development [3]. The study area of this paper has 30 municipal study units in the Central Plains region, including Zhengzhou, Kaifeng, Luoyang, Nanyang, Anyang, Shangqiu, Xinxiang, Pingdingshan, Xuchang, Jiaozuo, Zhoukou, Xinyang, Zhumadian, Hebi, Puyang, Luohe, Sanmenxia, and Jiyuan in Henan Province; Changzhi, Jincheng, and Yuncheng in

Shanxi Province; Xingtai and Handan in Hebei Province, Liaocheng and Heze in Shandong Province; Huaibei, Bengbu, Suizhou, Fuyang, and Bozhou in Anhui Province (Figure 1).



**Figure 1.** The Central Plains: location, administrative divisions, transport situation, and tourism attractions, 2018.

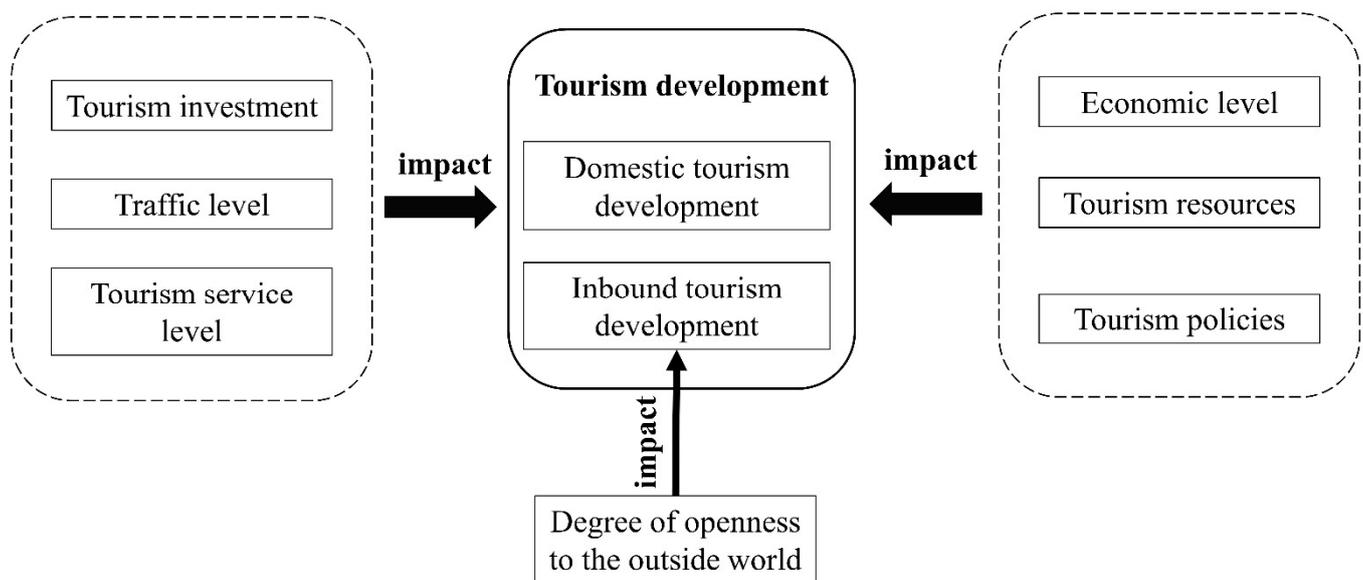
## 2.2. Indicator Selection

The existing literature selected visitor numbers, tourism revenue, length of stay, and tourism specialization to characterize tourism development; however, tourism revenue is probably the most appropriate, as it combines visitor numbers and length of stay [20]. Domestic tourism revenue and inbound tourism revenue can represent the level of tourism development. In line with most previous studies, this paper uses domestic tourism revenue (DR) and inbound tourism revenue (IR) to characterize domestic tourism development and inbound tourism development respectively, using both as dependent variables [37].

Tourism development is influenced by a combination of factors. Based on the results of scholars' research, this paper argues that tourism investment, traffic level, tourism service level, economic level, tourism resources, and tourism policies are the factors affecting tourism development. Moreover, the level of openness to the outside world plays an important role in inbound tourism development (Figure 2).

1. Tourism investment is an important impact factor affecting tourism development [24]. Tourism investment is explained by the amount of accommodation and restaurant fixed asset investment.
2. Inbound tourism is heavily influenced by international trade [34]. The degree of openness to the outside world can be characterized by total imports and exports as a percentage of GDP, which is a reflection of the region's attitude to foreign things.
3. Transport infrastructure is vital to tourism development [38,39]. Therefore, using highway density is appropriate to represent the local traffic level.
4. Hotel service level acts as a material condition for tourism economic activity [40], so one can use the number of starred hotels to measure the tourism service level in a city.
5. The changes in the regional economy are closely related to changes in regional differences in tourism revenues [18], therefore using GDP to represent the local economic level is appropriate.
6. Tourism resources are a decisive factor in the formation of spatial and temporal differences in tourism development [41]. One can use the number of Class 4A or above tourism attractions to represent tourism resources.

7. In China, tourism policy direction plays an essential role in the tourism development of cities. The Chinese central government is constantly providing guidelines and advice on city honors in an attempt to encourage the transformation of city development towards tourism, enhance the tourism potential of city honors, and advocate sustainable urban development. The “Civilized City” is the highest honor in China’s city evaluation system, with tourism construction taking up a significant part of the evaluation indicators for the “Civilized City”. Cities that have been awarded the title of “Civilized City” not only improve the tourism environment but also raise the visibility and brand value of the city and promote tourism development [42]. The title of “Civilized City” is an important tool for cities to implement the tourism policies issued by the central government. Therefore, this paper reflects tourism policy direction orientation by a city on whether to be rated as a “Civilized City”.



**Figure 2.** Mechanisms of impact of various impact factors on tourism development.

Based on the above analysis, the positive indicators of the amount of accommodation and restaurant fixed asset investment, total imports and exports as a percentage of GDP, highway density, the number of starred hotels, GDP, number of Class 4A or above tourism attractions, and whether to be rated as a “Civilized City” are selected as independent variables in this paper (Table 1).

**Table 1.** Definitions and descriptions of variables.

Category	Variable	Abbreviation	Nature of Variables
Tourism investment	the amount of accommodation and restaurant fixed asset investment	ARFAI	Positive
Degree of openness to the outside world	total imports and exports as a percentage of GDP	IEP	Positive
Traffic level	highway density	HD	Positive
Tourism service level	the number of starred hotels	NSH	Positive
Economic level	gross domestic product	GDP	Positive
Tourism resources	number of Class 4A or above tourism attractions	NCTS	Positive
Tourism policies	whether to be rated as a “Civilized City”	CC	Positive

### 2.3. Research Methods

#### 2.3.1. Moran Index

The global spatial autocorrelation expresses the degree of spatial dependence of each unit within its spatial scope from the perspective of the total spatial scope and can explore the spatial agglomeration of inbound tourism development of each city, which is often used in Moran's index as an indicator to characterize the spatial correlation of each unit. The formula is calculated as follows.

$$\text{Moran's } I = \frac{\sum_{i=1}^n \sum_{j=1}^n (Y_i - \bar{Y})(Y_j - \bar{Y})}{S^2 \sum_{i=1}^n \sum_{j=1}^n W_{ij}} \quad (1)$$

$$S^2 = \frac{1}{n} \sum_{i=1}^n (Y_i - \bar{Y})^2$$

$$\bar{Y} = \frac{1}{n} \sum_{i=1}^n Y_i$$

where  $Y_i$  and  $Y_j$  are the quantity values of the  $i$ -th and  $j$ -th regions;  $n$  is the total number of each study unit;  $W_{ij}$  is the spatial weight matrix; the value of Moran's index ranges from (0, 1), the closer the value is to 1, the stronger the spatial positive correlation of the study unit, and vice versa, the stronger the spatial negative correlation; if the value of Moran index is 0, it means that the spatial correlation of each study unit in the spatial range is 0.

#### 2.3.2. Spatial Durbin Model

The spatial Durbin model can examine the endogenous correlation of dependent variables and detect the direct and interactive effects of external factors, enabling a more accurate estimation of the spatial correlation of tourism development in the Central Plains and the degree of influence of each impact factor [43].

$$y = \rho \sum_{j=1}^n w_{ij} y_{it} + \beta x_{it} + \theta \sum_{j=1}^n w_{ij} x_{it} + \mu_i + \varphi_t + \varepsilon_{it} \quad (2)$$

where  $y_{it}$  is the observed value of the dependent variable;  $x_{it}$  is the observed value of the independent variable;  $\rho$  is the spatial regression coefficient of the explanatory variable.  $\theta$  is the spatial regression coefficient of the explanatory variable;  $\beta$  is the regression coefficient of the independent variable;  $\varphi_t$  and  $\mu_i$  denote time fixed effects and spatial fixed effects respectively;  $\varepsilon_{it}$  is a random error term obeying independent identical distribution, denoting other factors not included in the econometric model;  $w_{ij}$  is the spatial weight matrix.

#### 2.3.3. Geodetector Models

The variability in the spatial distribution of geographical objects is strongly influenced by economic, social, and natural factors, and exploring their mechanisms is an important part of geographic research. The geodetector model gives due consideration to the geographical associations between the study units [44]. The geodetector model is a set of statistical methods for detecting the spatial variability of something and the driving forces behind it. The core idea of the geodetector model is based on the assumption that if an independent variable has a significant effect on a dependent variable, then the spatial distribution of the independent and dependent variables should be similar [45,46]. In order to further explore in depth the factors influencing tourism development, the geodetector model is selected and the divergence and factor detection functions of the geodetector model are used to measure the impact factors for each year from 2011 to 2018. The formula of the geodetector model is as follows.

$$q = 1 - \frac{\sum_h^L N_h \sigma_h^2}{N \sigma^2} = 1 - \frac{SSW}{SST} \quad (3)$$

$$SSW = \frac{\sum_h^L N_h \sigma_h^2}{N \sigma^2}$$

$$SST = N \sigma^2$$

where  $h = 1, L$  is the strata of variable  $Y$  or factor  $X$ , that is, classification or partitioning;  $N_h$  and  $N$  are the number of units in strata  $h$  and the whole area, respectively;  $\sigma_h^2$  and  $\sigma^2$  are the variances of  $Y$  values in strata  $h$  and the whole area, respectively.  $SSW$  and  $SST$  are within sum of squares and total sum of squares, respectively. The value range of  $q$  is  $(0, 1)$ , with larger values indicating more pronounced spatial heterogeneity of  $Y$ . If the stratification is generated by the independent variable  $X$ , larger values of  $q$  indicate stronger explanatory power of the independent variable  $X$  for attribute  $Y$  and vice versa. In the extreme case, a  $q$ -value of 1 indicates that factor  $X$  completely controls the spatial distribution of  $Y$ . A  $q$ -value of 0 indicates that factor  $X$  has no relationship with  $Y$ . The  $q$ -value indicates that  $X$  explains  $100 \times q\%$  of  $Y$ . A simple transformation of the  $q$ -values satisfies the non-central  $F$  distribution, the formula is as follows.

$$F = \frac{N-L}{L-1} \frac{q}{1-q} \sim F(L-1, N-L; \lambda) \quad (4)$$

$$\lambda = \frac{1}{\sigma^2} \left[ \sum_{h=1}^L \bar{Y}_h^2 - \frac{1}{N} \left( \sum_h^L \sqrt{N_h} \bar{Y}_h \right)^2 \right] \quad (5)$$

where  $\lambda$  is the non-central parameter;  $\bar{Y}_h$  is the mean value of strata  $h$ . According to Formula (5), one can look up the table or use the Geodetector software to check whether the  $q$ -value is significant.

#### 2.4. Data Collection

The data in this paper were mainly derived from the China City Statistical Yearbook, the China Regional City Statistical Yearbook, the Henan Statistical Yearbook, the Hebei Economic Yearbook, the Shanxi Statistical Yearbook, the Anhui Statistical Yearbook, the Shandong Statistical Yearbook, the yearbooks of each city, and the statistical bulletins of each city. This paper obtained the required statistical yearbook and statistical bulletin data from the big data research platform of China Knowledge Network (<https://www.cnki.net/>, accessed on 5 November 2020). The specific data obtained are as follows: domestic tourism revenue, inbound tourism revenue, the amount of accommodation and restaurant fixed asset investment, total imports and exports, GDP, highway mileage, the number of starred hotels, number of Class 4A or above tourism attractions, and city area. The list of civilized cities is from the China Civilization website (<http://www.wenming.cn/>, accessed on 16 May 2021).

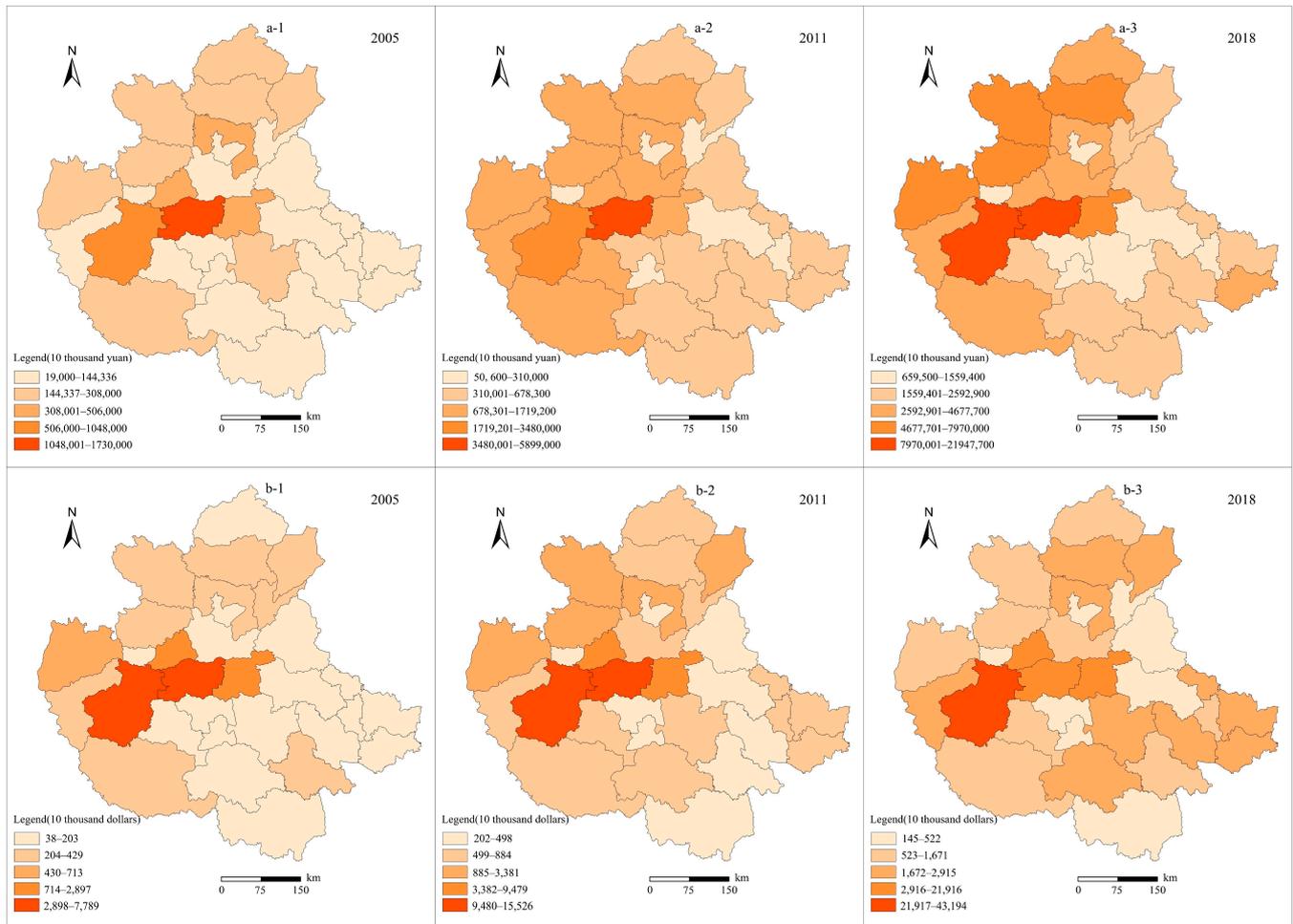
After data collection, the panel data of 30 cities in the Central Plains from 2005 to 2018 were obtained.

### 3. Results

#### 3.1. The Pattern of Spatial Differentiation and Spatial Association Characteristics of Tourism Development

The evolutionary characteristics of the spatial distribution pattern of domestic tourism and inbound tourism indicated the spatial divergence effect of the two in the Central Plains from 2005 to 2018 (Figure 3). The year 2011 was chosen as the time point for the study due to the following two main reasons. Firstly, in 2009, the Chinese State Council issued the "Opinions on Accelerating the Development of Tourism" proposed to "cultivate tourism as a strategic pillar industry of the national economy", which became a symbol of the

transformation of China's tourism industry. The tourism industry entered a rapid phase of development. These policy measures may have an impact on tourism development in the Central Plains region with a lag of 1–2 years. Secondly, 2011 is the start of China's 12th Five-Year Plan, and the 12th Five-Year Plan proposes to “actively develop tourism”; therefore, it is necessary to choose 2011 as the time point for the study.



**Figure 3.** Spatial distribution of tourism development in the years 2005, 2011, and 2018. Note: (a,b) denote the spatial distribution of domestic tourism development and inbound tourism development, respectively; (1), (2), and (3) denote the years 2005, 2011, and 2018, respectively.

From 2005 to 2018, the spatial distribution of domestic tourism and inbound tourism in the Central Plains was similar in character, with both showing a process of spatial evolution from polarization to relative diffusion. In 2005, the higher-level areas for both domestic tourism and inbound tourism were distributed to cities rich in tourism resources such as Zhengzhou, Luoyang, Kaifeng, and Jiaozuo. In 2011, the higher-level areas of domestic tourism and inbound tourism began to diffuse, showing the spatial distribution characteristics of higher levels in the west and lower levels in the east. In 2018, the higher-level areas of domestic tourism and inbound tourism areas were still concentrated in the cities of Zhengzhou, Luoyang, and Kaifeng, but the spatial polarization effect of tourism development is significantly reduced relative to the early stage of the study, and tourism development showed a trend of spatial association.

We calculated the univariate Moran's I of domestic tourism development and inbound tourism development based on an exploratory spatial data analysis method (Table 2). From 2005 to 2018, it can be seen that Moran's index for both domestic and inbound tourism was positive and significant for each study unit in Central Plains. This suggests that tourism

development is spatially cumulative. Domestic tourism and inbound tourism showed a decreasing trend in the value of Moran's Index, which indicated a weakening of the spatial accumulation of both, similar to the conclusions reached in the spatial analysis above.

**Table 2.** Univariate Moran's I value for domestic tourism development and inbound tourism development.

	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
DR	0.143 **	0.162 **	0.192 ***	0.204 ***	0.23 ***	0.206 ***	0.195 ***	0.193 ***	0.195 ***	0.192 ***	0.188 **	0.138 **	0.162 **	0.133 **
IR	0.211 ***	0.22 ***	0.21 ***	0.211 ***	0.219 ***	0.231 ***	0.229 ***	0.218 ***	0.224 ***	0.177 **	0.143 **	0.125 **	0.096 **	0.107 **

Note: \*\*\* for  $p \leq 0.01$ ; \*\* for  $0.01 < p \leq 0.05$ .

Thus, in terms of the changing characteristics of spatial distribution and spatial association, tourism policies appeared to play a positive role in the integration of tourism development linkages. Spatial factors should be considered when measuring the impact on tourism development.

### 3.2. Spatial Regression Analysis of Factors Impacting Tourism Development

Firstly, a traditional mixed panel data model without spatial interaction effects was applied to the panel data of the Central Plains study unit for estimation and residual testing to determine whether the spatial lag and spatial error models were superior to the non-spatial model. Then, a likelihood ratio test was performed to determine whether the SDM could be degraded to a spatial lag model and a spatial error model. Finally, a Hausman test was performed to determine whether a fixed effect or a random effect was chosen. After testing, the results showed that the SDM with both temporal and spatial fixed effects is the most suitable measure of the factors impacting domestic tourism development and inbound tourism development.

Therefore, the SDM model was used to analyze the impact factors of tourism development based on panel data from 30 study units in the Central Plains from 2005 to 2018. Due to the large variation in indicator data, individual variables were logged prior to model estimation. Table 3 shows the SDM estimates.

**Table 3.** Results of the space Durbin model for the impact factors of domestic tourism development and inbound tourism development.

Variable	Coef of DR	Coef of IR
LnARFAI	−0.018	0.077 *
LnIEP		0.065 ***
LnHD	0.068 **	0.123 **
LnNSH	0.047	0.260 **
LnGDP	0.086 *	1.150 ***
LnNCTS	0.001 **	0.032 **
LnCC	0.045 *	0.132 **
W × LnARFAI	0.165 ***	−0.051
W × LnIEP		0.232 **
W × LnHD	0.095 **	0.035
W × LnNSH	0.187	0.148
W × LnGDP	−0.693 **	0.351
W × LnNCTS	0.230 *	0.172
W × LnCC	−0.230 **	−0.318 ***
R <sup>2</sup>	0.704	0.597
$\rho$	0.022 ***	0.015 ***

Note: \*\*\* for  $p \leq 0.01$ ; \*\* for  $0.01 < p \leq 0.05$ ; \* for  $0.05 < p \leq 0.1$ .

From Table 3, it can be seen that there are differences in the impact factors for domestic tourism and inbound tourism. The spatial autoregressive coefficients  $\rho$  for both domestic

tourism and inbound tourism passed the significance test at the 1% level, indicating that each impact factor either promotes or inhibits domestic tourism and inbound tourism in the local or neighboring areas. The results are as follows. (1) Domestic tourism is mainly positively influenced by traffic level, economic level, tourism resources, and tourism policies; while inbound tourism is significantly positively influenced by all impact factors. (2) In terms of spatial spillover effects, tourism investment, traffic level, and tourism resources showed positive effects on domestic tourism in neighboring regions; economic level and tourism policies showed negative effects on domestic tourism in neighboring regions; the degree of openness to the outside world showed positive effects on inbound tourism in neighboring regions; tourism policies showed negative effects on inbound tourism in neighboring regions. (3) There is no significant spatial spillover effect of impact factors such as tourism investment, traffic level, tourism resources, and economic level on inbound tourism in neighboring regions.

Analyzing the direct effects of variables on the spatial Durbin model's regression results shows that: (1) economic level, traffic level, tourism resources, and tourism policies all had a positive impact on domestic and inbound tourism, which is consistent with previous studies [20]. This indicates that with economic development and the promotion of relevant tourism policies, the urban traffic level has improved, tourism resources have been effectively developed, and tourism infrastructure has been renewed, which has contributed to the development of tourism. (2) Tourism investment and tourism service level showed a positive impact on inbound tourism. This indicates that with the increase in tourism investment and the development of the tertiary sector, represented by upscale hotels, it is possible to provide quality tourism experiences for foreign travelers and improve the level of inbound tourism development in the city. (3) The degree of openness to the outside world had a positive impact on inbound tourism. This suggests that greater openness to the outside world can increase the visibility of tourist cities, attract more inbound tourists, and promote the development of inbound tourism.

Analyzing the spatial spillover effects of variables on the spatial Durbin model's regression results shows that: (1) tourism investment, traffic level, and tourism resources showed a positive effect on domestic tourism in neighboring regions. Theoretically, according to the new economic geography theory, the endogenous growth theory, and the spatial attributes of tourism activities, the spillover effects of the impact factors of tourism development are mainly generated through mechanisms such as labor market sharing, knowledge spillover, and market sharing [47]. Firstly, the sharing of human capital in restaurants, hotels, and tourist attractions in different regions has facilitated the spillover of tourism marketing tools. The domestic tourism development of neighboring cities has been jointly improved. Secondly, the trans-regional nature of tourism activities, along with the close inter-regional transport links, allows for a more efficient spatial diffusion of tourism flows and has enhanced the domestic tourism development across the region [20]. (2) The economic level shows a negative effect on domestic tourism in neighboring regions. Economic level and tourism development show a high correlation, cities that have high economic levels, such as Zhengzhou and Luoyang, have more advantages to develop tourism. This can increase the length of stay for tourists in these areas and limit the spatial spread of tourism flows, which constrained the development of domestic tourism economies in surrounding cities. (3) There is no significant spatial spillover effect of impact factors such as tourism investment, traffic level, tourism resources, and economic level on inbound tourism in neighboring regions. This is mainly due to the uneven spatial distribution of tourism resources and tourism-related support infrastructure in the Central Plains. For inbound travelers, tourism destinations may be limited to world-renowned tourist cities such as Luoyang, Kaifeng, and Zhengzhou, with less potential for cross-regional travel. Therefore, spatial spillover effects of tourism development impact factors may occur between neighboring cities with high tourism resources and economic levels, while there are no significant spillover effects between neighboring cities with high and low levels or low and low levels. (4) The degree of openness to the outside world shows a positive effect on inbound tourism in neighboring

cities. Positive city promotion enhances the image of the city and attracts more foreign tourists to enter the travel destinations. Information on tourism resources in neighboring cities is available in the destination city, and the developed transport network makes it possible for them to travel across cities, which promotes the development of inbound tourism in neighboring cities. (5) Tourism policies have a negative effect on tourism development in neighboring areas. This may be due to the expansion of tourism-related infrastructure, the effective development of tourism resources, and aggressive city promotion as a result of the implementation of tourism promotion policies in one city, which may attract more tourists and cut off the source of tourists from neighboring cities that have not implemented tourism-friendly policies. Therefore, this constrained the tourism economy development of neighboring cities.

### 3.3. Analysis of Changes in Factors Impacting Tourism Development

In 2009, the Chinese government clearly proposed to “cultivate tourism as a strategic pillar industry of the national economy”, and with the intensive introduction of tourism policies, China’s tourism industry had entered a rapid development stage. While these policy measures may have an impact on the tourism development of the Central Plains with a lag of 1–2 years. Simultaneously, 2011 is also the beginning of China’s 12th Five-Year Plan, one of the themes of which is “actively developing tourism”. Therefore, in the context of the Chinese government’s strong efforts to develop tourism, it is of great significance to measure the changes in the impact factors on tourism development in the Central Plains since 2011. In order to accurately describe the changes in the impact factors affecting tourism development, we selected the period 2011–2018 as the time interval for the study, used the fishnet method to equate the Central Plains region into 11,871 squares of 5 km × 5 km, and the independent variables were analyzed separately for each year using the geodetector model.

The results of the measurements are shown in Tables 4 and 5. After calculations, it was found that the independent variables for both domestic tourism and inbound tourism passed the significance test for each year from 2011 to 2018 at  $p < 0.01$ . Therefore, the top three values of the impact factor coefficient for each year are defined as the main impact factors for that year. There is significant variability in the temporal changes in the factors influencing domestic tourism and inbound tourism. (1) From 2011 to 2013, domestic tourism was mainly impacted by tourism policies, tourism services, and economic level; from 2014 to 2018, the main impact factors on domestic tourism shifted to tourism resources, economic level, and tourism policies. (2) From 2011 to 2014, inbound tourism was mainly influenced by tourism policies, tourism resources, and tourism services; from 2015 to 2018, the main impact factors on inbound tourism shifted to tourism investment, tourism policies, and economic level. The degree of openness to the outside world does not have a major impact on inbound tourism.

**Table 4.** Results of the geodetector model for the impact factors of domestic tourism development.

Variable	Coef							
	2011	2012	2013	2014	2015	2016	2017	2018
ARFAI	0.47 ***	0.45 ***	0.27 ***	0.38 ***	0.33 ***	0.40 ***	0.39 ***	0.33 ***
HD	0.19 ***	0.29 ***	0.26 ***	0.21 ***	0.09 ***	0.28 ***	0.15 ***	0.18 ***
NSH	0.75 ***	0.75 ***	0.45 ***	0.42 ***	0.41 ***	0.34 ***	0.35 ***	0.32 ***
GDP	0.67 ***	0.65 ***	0.64 ***	0.59 ***	0.48 ***	0.55 ***	0.41 ***	0.49 ***
NCTS	0.36 ***	0.40 ***	0.44 ***	0.50 ***	0.58 ***	0.55 ***	0.73 ***	0.60 ***
CC	0.78 ***	0.75 ***	0.75 ***	0.46 ***	0.46 ***	0.51 ***	0.56 ***	0.42 ***

Note: \*\*\* for  $p \leq 0.01$ .

**Table 5.** Results of the geodetector model for the impact factors of inbound tourism development.

Variable	Coef							
	2011	2012	2013	2014	2015	2016	2017	2018
ARFAI	0.36 ***	0.30 ***	0.19 ***	0.30 ***	0.54 ***	0.78 ***	0.77 ***	0.78 ***
IEP	0.36 ***	0.32 ***	0.30 ***	0.31 ***	0.24 ***	0.24 ***	0.22 ***	0.19 ***
HD	0.20 ***	0.20 ***	0.19 ***	0.13 ***	0.14 ***	0.16 ***	0.20 ***	0.11 ***
NSH	0.43 ***	0.40 ***	0.37 ***	0.34 ***	0.31 ***	0.33 ***	0.31 ***	0.32 ***
GDP	0.36 ***	0.32 ***	0.30 ***	0.31 ***	0.24 ***	0.24 ***	0.22 ***	0.19 ***
NCTS	0.40 ***	0.43 ***	0.45 ***	0.37 ***	0.40 ***	0.44 ***	0.43 ***	0.44 ***
CC	0.87 ***	0.85 ***	0.85 ***	0.61 ***	0.61 ***	0.64 ***	0.58 ***	0.67 ***

Note: \*\*\* for  $p \leq 0.01$ .

Analyzing the results of the geodetector model measures from 2011 to 2018, we found that both domestic tourism and inbound tourism were mainly impacted by tourism policies from 2011 to 2018. Therefore, the tourism policies factor is used as the main entry point for the analysis of the main impact factors of both. (1) Domestic tourism was mainly influenced by tourism policies, tourism service level, and economic level from 2011 to 2013; inbound tourism was mainly influenced by tourism policies, tourism resources, and tourism service level from 2011 to 2014. In 2009, China's State Council issued "the Opinions on Accelerating the Development of Tourism", proposing to "cultivate tourism as a strategic pillar industry of the national economy", and China's tourism industry entered a rapid stage of development. During this period, the tourism service level and tourism resources developed at a rapid pace, driven by tourism policies and supported by the economic level of the city. This had attracted a large number of travelers, and both domestic and inbound tourism had grown significantly. (2) From 2014 to 2018, the main impact factors for domestic tourism were tourism resources, economic level, and tourism policies; from 2015 to 2018, the main impact factors for inbound tourism were tourism investment, tourism policies, and economic level. The factors influencing tourism development have changed little, with tourism policies and economic level still being the main impact factors. However, the influence of tourism service level has declined, with tourism resources a new main impact factor on domestic tourism and tourism investment a new main impact factor on inbound tourism. In 2014, the Chinese State Council issued "Several Opinions of the State Council on Promoting the Reform and Development of Tourism", which clearly stated "optimizing the environment for tourism development". Driven by tourism policies and urban economies, tourist attractions and related tourism support facilities have been optimized. Therefore, domestic tourist arrivals have increased, as has per capita spending at attractions, leading to tourism resources have become the most important influencing factor affecting domestic tourism. In 2015, the Chinese State Council issued "Several Opinions on Further Promoting Tourism Investment and Consumption", which proposed the "implementation of tourism investment promotion plan" while continuing to implement the strategy of promoting tourism development, placing tourism investment in an essential role. The tourism services level represented by star hotels had been fully developed in the previous period and the promotion of tourism development began to slow down, while tourism investment began to be an important driving force for tourism development in the city due to policy effects. The inbound tourism economy is smaller relative to the domestic tourism economy and is sensitive to the changes in the larger values of impact factors relative to the domestic tourism economy, so tourism investment had the greatest impact on inbound tourism in 2015–2018.

#### 4. Discussion

The spatial distribution of domestic tourism and inbound tourism in the Central Plains has a clustering effect, and there are obvious positive spatial correlation characteristics. Thus, it is necessary to consider spatial effects when analyzing the impact factors of tourism development. The results of this paper have theoretical implications. This study has

two theoretical contributions. First, this paper considered spatial and temporal factors in analyzing the impact factors of tourism development and explored the spatial spillover effects of the impact factors on inbound and domestic tourism respectively based on SDM. Second, this study further explored the changes in the impact factors of domestic tourism and inbound tourism respectively on a time series basis. Therefore, this paper provides reasonable conclusions in the analysis of the factors influencing tourism development by adopting a rational approach, which contributes to the study of tourism geography. Simultaneously, there are some limitations in this paper. First, the level of urban tourism development is also influenced by tourists' city impression, which is not constructed in this paper. Second, in the context of the new crown epidemic, the evolving characteristics of the impact factors on urban tourism development is also a key aspect to focus on.

## 5. Conclusions

Based on the panel data of 30 cities in the Central Plains region from 2005 to 2018, firstly, the spatial differentiation pattern characteristics and spatial association characteristics of tourism development were analyzed. The spatial distribution characteristics of domestic tourism and inbound tourism are similar, and the spatial agglomeration of both has significantly narrowed relative to the beginning of the study. In addition, the spatial Durbin model was used to measure the overall impact factors on tourism development from 2005 to 2018. The results found that domestic tourism is impacted positively by traffic level, economic level, tourism resources, and tourism policies; while inbound tourism is significantly and positively impacted by all the impact factors. Most of the impact factors have a spillover effect on domestic tourism, while only the level of openness to the outside world and tourism policies have a spillover effect on inbound tourism. Finally, the impact factors for each year from 2011 to 2018 were explored based on the geodetector model. The main impact factors on both domestic tourism and inbound tourism have long been time-varying. Domestic tourism development has been impacted for a long time mainly by tourism policy factors and economic levels. Inbound tourism development has been impacted by tourism policy factors for a long time, while we found that the level of openness to the outside world does not have a major impact on inbound tourism.

The findings of this paper offer two policy recommendations for the tourism development of the Central Plains. Firstly, for domestic tourism development, a government department to coordinate tourism development should be established in the Central Plains. Government departments should create differentiated tourism development policies based on the current status in different cities, which promote the differentiation of tourism products in different cities. Moreover, government departments should continue to promote city-to-city tourism cooperation. By expanding the spatial spillover effects of various influences on domestic tourism, the integrated development of domestic tourism can be achieved. Secondly, for inbound tourism development, the government should put emphasis on the development of cities with rich tourism resources, high economic levels, and well-established tourism industries, such as Zhengzhou, Luoyang, and Kaifeng. These cities need to continuously issue regulations suitable for local tourism development based on the central government's tourism policy and continue to expand their inbound tourism economies by increasing investment in relevant tourism infrastructure. What is more, cities with developed inbound tourism should increase cooperation between local attractions and those in neighboring cities to create diversified and differentiated tourism products. It is also important to strengthen the promotion of foreign tourists, provide preferential policies for cross-regional tourism, and achieve spatial diffusion of the inbound tourism economy through increasingly convenient transportation conditions. Ultimately, these measures will lead to the inbound tourism development of the entire region.

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