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Evaluating and Identifying Influencing Factors of the Development Level of Regional Red Tourism Scenic Spots: A Case Study of the Central Plains Region

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Abstract: Red tourism is a distinctive form of cultural tourism in China, centered on revolutionary heritage and national memory. However, existing studies have often focused on individual sites or administrative units, lacking systematic evaluations at a broader regional scale and overlooking the combined effects of multiple influencing factors. To address these gaps, this study takes the Central Plains region as a case study and evaluates the development level of 317 red tourism scenic areas. A five-dimensional evaluation framework was constructed, incorporating basic support, resource support, regional support, government support, and new media support. Spatial classification, spatial clustering, and spatial association methods were employed to analyze spatial differentiation patterns and development characteristics. The results show that development levels vary significantly across sites, forming a stratified distribution pattern. High-level scenic areas are relatively evenly distributed, while medium- and higher-level scenic areas cluster in the central and northern parts of the region, and lower-level sites are concentrated in Zhengzhou, Xinyang, Liaocheng, and Changzhi. The overall distribution follows a core–cluster structure, with high-value hotspots in Kaifeng and cold spots in Xinxian and northeastern Luoyang. Further analysis indicates that resource endowment and effective development are the fundamental drivers of red tourism growth, while location, infrastructure, government support, and media promotion play important supporting roles. This study expands the evaluation perspective of red tourism by adopting a township-scale analysis and provides new insights for regional tourism planning, heritage protection, and the sustainable development of red tourism resources.

Keywords: red tourism; development evaluation; spatial analysis; influencing factors; Central Plains region

1. Introduction

Red tourism refers to tourism activities that rely on revolutionary cultural heritage as the core resource, it plays a unique role in strengthening cultural confidence, promoting patriotism, and supporting regional economic development [1]. In recent years, China has attached great importance to red tourism. A series of policies, such as the National Red Tourism Development Plan and related implementation schemes, have been introduced to provide institutional guarantees and development opportunities. With the rapid growth of domestic tourism demand, red tourism has gradually evolved from a traditional commemorative activity into an important form of



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cultural tourism and a driver of regional integration [2]. Therefore, conducting research on red tourism can provide theoretical support for heritage protection, guide differentiated regional development strategies, and promote the sustainable growth of the tourism industry [3,4].

Research on red tourism has developed alongside the broader field of tourism studies. Early scholarship mainly explored the cultural and commemorative functions of tourism, with particular attention to the role of heritage sites in conveying historical memory and ideological values [5]. Internationally, studies on battlefield tourism and war-related heritage provided valuable insights into the educational and symbolic value of such destinations [6–8]. Building on this foundation, Chinese scholars gradually turned their attention to revolutionary cultural resources [9,10], highlighting their role in patriotic education, cultural inheritance, and identity construction. More recent research has expanded to examine the economic and social dimensions of red tourism [11,12], including its contribution to regional development [13], industrial upgrading [14], and rural revitalization [15]. At the same time, spatial analytical approaches have been applied to investigate the distribution and development characteristics of red tourism sites, revealing regional disparities and uneven growth [16,17]. Despite these advances, existing studies still fall short in systematically evaluating development levels at a regional scale, and they often overlook the combined influence of resource endowment, regional support, government guidance, and media promotion on the sustainable development of red tourism [18]. Against this backdrop, there is a pressing need for systematic region-scale assessments that adopt township-level units, integrate multiple drivers, and map spatial differentiation in development levels to generate comparable evidence for coordinated planning and targeted interventions.

The Central Plains region holds a unique position in China's revolutionary history and modern economic development [19]. It not only contains rich red cultural resources but also acts as a key hub in the national transportation network and economic corridor. Exploring the development level and spatial pattern of red tourism sites in this region is thus of both theoretical and practical significance. This study constructs an evaluation framework based on five dimensions: basic support, resource endowment, regional support, government support, and new media influence. By applying spatial classification, spatial agglomeration, and spatial association methods, it aims to reveal the spatial differentiation of red tourism sites, clarify the driving factors of development, and provide policy implications for optimizing the structure and improving the quality of red tourism in the Central Plains.

2. Materials and Methods

2.1. Study Area

In this study, the Central Plains region is defined strictly in accordance with the Central Plains Urban Agglomeration Development Plan (2016–2030) issued by the State Council of China (Figure 1). Under this official planning framework, the Central Plains Urban Agglomeration is a national-level urban system centered on Henan Province and comprises the following cities: all prefecture-level cities in Henan Province; southern Shanxi (including Changzhi and Jincheng); southern Hebei (including Handan and Xingtai); western Shandong (including Heze and Jining); and northern Anhui (including Fuyang, Bozhou, and Huaibei) [20]. The region is characterized by a dense population, convenient transportation, and a rich accumulation of revolutionary cultural resources [21,22]. Historically, it was a major battlefield of the Chinese revolution and is home to numerous revolutionary sites, memorial facilities, and former residences of revolutionary leaders. At present, the Central Plains not only plays a key role in the strategy of promoting high-quality development in the Yellow River Basin but also serves as an important growth pole for China's economic development.

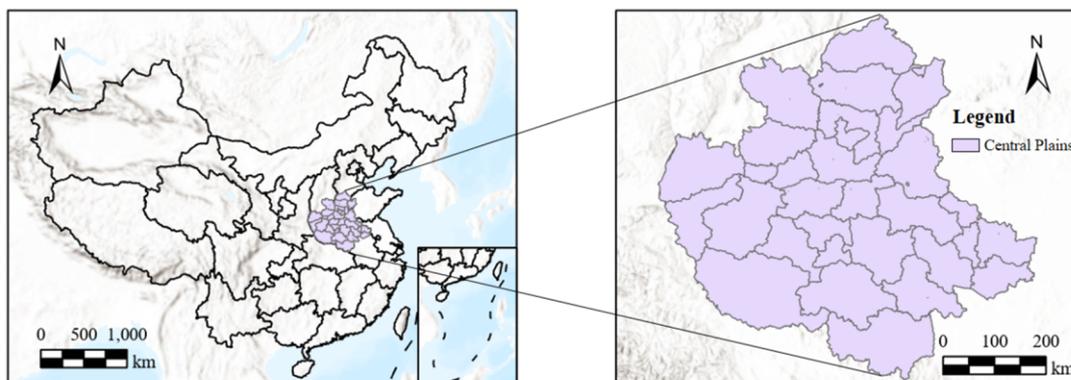


Figure 1. Spatial distribution of red tourism sites in the Central Plains region.

2.2. Data Sources

The data on red tourism sites were mainly obtained from the National Red Tourism Classic Scenic Sites Construction Plan (Phase III) as well as the official websites of provincial and municipal tourism authorities and the Boya Cultural Tourism Network. Scenic sites were then verified and screened according to their grade, location, and attributes, with those showing serious information deficiencies or uncertainty excluded. Finally, 317 red tourism sites were identified as the research objects (Figure 2).

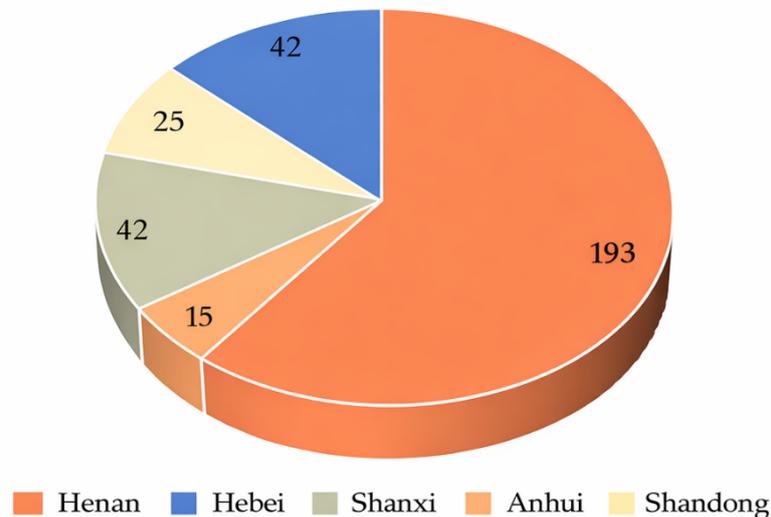


Figure 2. Statistical chart of red scenic areas in the Central Plains region.

Prior to data analysis, strict operational exclusion criteria were applied to ensure data quality and reliability. Sampling sites with abnormal or logically inconsistent values, duplicate records, and incomplete core indicator information were excluded from the formal analysis [23]. Missing values for key variables were handled using linear interpolation for continuous series data and mean substitution for cross-sectional indicators according to data characteristics. In total, 3 sampling sites were removed during data preprocessing, and all remaining valid observations were used for subsequent analysis.

2.3. Methods

2.3.1. Construction of the Indicator Evaluation System

In recent years, the development of red tourism sites has gained increasing prominence in national tourism strategies, and their popularity among the public has continued to rise [24]. Accordingly, the construction of evaluation indicator systems for these sites has attracted growing attention. Previous studies have adopted different indicators, which can generally be grouped into three categories: (1) indicators of current development level, such as site grade, area, and resource conditions, reflecting the present status of development; (2) indicators of socio-economic support, such as policy support, location, and ticket price, reflecting the contribution of socio-economic factors; and (3) indicators of future development potential, such as online influence and the number of social media followers, reflecting the prospects of further growth.

Building on these perspectives and taking into account the availability, representativeness, and hierarchy of indicators, this study constructed an evaluation system encompassing five dimensions: basic support, resource support, regional support, government support, and new media support (Table 1). Specifically, basic support was represented by site area, site grade, and ticket price; resource support by the richness of red tourism resources, preservation of historical relics, integration of culture and tourism, historical and cultural value, and natural landscape value; regional support by the number of surrounding red tourism sites, locational advantages, transportation accessibility, and the level of regional coordinated development; government support by the degree of governmental attention and policy commitment; and new media support by online influence and Baidu search volume.

Common methods for evaluating tourism sites include principal component analysis [25], cluster analysis [26], and the analytic hierarchy process (AHP) [27–29], each with distinct strengths and limitations. Given the large number of red tourism sites and the substantial heterogeneity among indicators in the Central Plains region, this study combined expert scoring with AHP to determine indicator weights in a transparent and reproducible manner. A total of 10 experts with backgrounds in tourism geography, red tourism studies, regional planning, and

related fields were invited to participate in the weighting process, all of whom possessed substantial research or practical experience in tourism development and heritage evaluation. Pairwise comparisons of indicators were performed according to their relative importance in reflecting the development level of red tourism sites, following the hierarchical structure presented in Table 1 and using the Saaty 1–9 scale.

Table 1. Evaluation index system for red tourism sites in the Central Plains region.

Primary Indicator	Primary Indicator Weight	Secondary Indicator	Secondary Indicator Weight
Basic support (C1)	0.129	Site area (P1)	0.033
		Site grade (P2)	0.035
		Ticket price (P3)	0.082
Resource support (C2)	0.512	Integration of culture and tourism (P6)	0.029
		Historical and cultural value (P7)	0.032
		Natural landscape value (P8)	0.017
		Richness of red tourism resources (P4)	0.263
		Integrity of historical relics (P5)	0.134
Regional support (C3)	0.261	Locational advantage (P10)	0.147
		Transportation accessibility (P11)	0.030
		Number of surrounding red tourism sites (P9)	0.014
		Regional coordinated development (P12)	0.060
Government support (C4)	0.063	Government policy support (P13)	0.031
New media support (C5)	0.033	Online influence (P14)	0.025
		Baidu search volume (P15)	0.008

Each indicator was operationally defined based on the established evaluation index system, and experts were instructed to base their judgments strictly on these definitions. To ensure comparability across indicators, all raw data were standardised prior to aggregation using min–max normalisation to transform values into a [0,1] range [30,31]. Indicators with negative directionality, such as ticket price, for which higher values may imply lower accessibility and development potential, were inversely transformed to maintain a consistent interpretative direction [32]. Expert judgments were then aggregated by calculating the average values of the pairwise comparison scores to construct the judgment matrices at each hierarchical level, and the consistency of these matrices was assessed using the consistency ratio (CR). All CR values were below the commonly accepted threshold of 0.1, indicating acceptable consistency and reliability of the expert judgments, on the basis of which the final indicator weights were derived [24]. Based on the derived indicator weights and the standardised indicator values, composite development scores for individual red tourism sites were calculated by summing the products of each indicator's weight and its corresponding standardised value.

2.3.2. Spatial Analysis Methods

Spatial Hierarchical Analysis

The natural breaks classification method divides research objects into groups with similar characteristics by identifying natural turning points in statistical data [33]. This approach minimizes within-group differences while maximizing between-group differences, thereby achieving meaningful clustering. In this study, the method was applied to classify the evaluation scores of 317 red tourism sites in the Central Plains. This classification provides a clear and intuitive representation of both the spatial distribution characteristics and the spatial structure of development levels across the sites.

Spatial Agglomeration Analysis Method

The kernel density analysis method evaluates the distribution density of point features based on their absolute spatial locations and identifies areas of core agglomeration [34,35]. In this study, the kernel density estimation was implemented using the default bandwidth setting of the GIS software. This method provides a direct and clear representation of hot and cold spots in the development of red tourism sites in the Central Plains. In this study, kernel density analysis was applied to examine the spatial clustering and dispersion of these sites within the study area. The calculation formula is as follows:

$$f(x,y) = \frac{1}{nh^2} \sum_{i=1}^n K \left(\frac{\sqrt{(x-x_i)^2 + (y-y_i)^2}}{h} \right) \quad (1)$$

where, $f(x,y)$ is the kernel density estimate at spatial point (x,y) , n is the number of red tourism scenic spots within the search radius of the estimation point, h is the bandwidth (search radius) for kernel density analysis, x and y are the spatial coordinate values of the estimation point, x_i and y_i are the spatial coordinate values of the i -th red tourism scenic spot, and K is the standard symmetric Epanechnikov kernel function.

The nearest neighbor index is a geographic measure used to describe the degree of proximity among point features in space [36]. It effectively reflects the spatial distribution characteristics of point elements. To ensure operability in the analysis, red tourism sites were approximated as point features, and this method was employed to analyze their spatial structural characteristics. The calculation formula is expressed as:

$$R = \frac{\bar{r}}{r_T} \quad (2)$$

$$r_T = \frac{1}{2\sqrt{n/S}} \quad (3)$$

In the formula, R represents the nearest neighbor index; \bar{r} is the observed average nearest neighbor distance; r_T is the expected nearest neighbor distance; n denotes the number of tourism sites; and S is the area of the study region. When R is greater than 1, the sites are evenly distributed. When R equals 1, the sites are randomly distributed. When R is less than 1, the sites exhibit a clustered distribution.

The geographic concentration index is commonly used in geography to analyze the degree of concentration of features within different regions, serving as an important indicator of spatial aggregation and dispersion [37]. In this study, the five provinces covered by the Central Plains region were taken as research units, and the geographic concentration index was applied to measure the spatial agglomeration of red tourism sites across provinces. The calculation formula is expressed as:

$$G = 100 \times \sqrt{\sum_{i=1}^n \left(\frac{X_i}{T} \right)^2} \quad (4)$$

In the formula, G represents the geographic concentration index of tourism sites; n is the number of provincial units; X denotes the number of tourism sites in the i -th province; and T is the total number of tourism sites. The value of G ranges from 0 to 100. A higher G indicates a more concentrated distribution, while a lower G indicates a more dispersed distribution.

All spatial analyses, including KDE and Getis-Ord G_i^* , were performed using ArcGIS Pro 3.0 (Esri, Redlands, CA, USA). For KDE, the Epanechnikov kernel function was adopted with a search radius of 50,000 m, an output cell size of 1000 m, and area units in square kilometers. For hotspot analysis, the fixed distance band spatial relationship concept was applied based on Euclidean distance with a threshold distance of 50,000 m; standard z-score standardization was implemented, and statistical significance thresholds were set at $p < 0.05$ and $p < 0.01$ to identify significant hot and cold spots.

Spatial Association Analysis Method

The local Getis-Ord method, also known as hotspot analysis, is used to examine the spatial distribution patterns of geographic features with specific economic attributes and to determine whether they exhibit spatial correlation with neighboring areas [38]. To provide an intuitive representation of the spatial association, clustering characteristics, and interdependence of red tourism sites in the Central Plains region, this study employed the local Getis-Ord method to identify spatial hot and cold spots. The calculation formula is expressed as:

$$z(G_i^*) = \frac{G_i^* - E(G_i^*)}{\sqrt{\text{Var}(G_i^*)}} \quad (5)$$

where, $z(G_i^*)$ is the standard z-score of the local Getis-Ord statistic, G_i^* is the original local Getis-Ord statistic for the i -th red tourism scenic spot, $E(G_i^*)$ is the mathematical expected value of G_i^* , $\text{Var}(G_i^*)$ is the variance of G_i^* , i is the serial number of the red tourism scenic spot.

3. Results

3.1. Spatial Differentiation Characteristics

Using the Jenks natural breaks classification method, the evaluation scores of 317 red tourism sites in the study area are categorized into different levels. To provide an intuitive understanding and analysis of the spatial distribution of development levels, the comprehensive development scores of the sites are further visualized at the township scale (Figure 3).

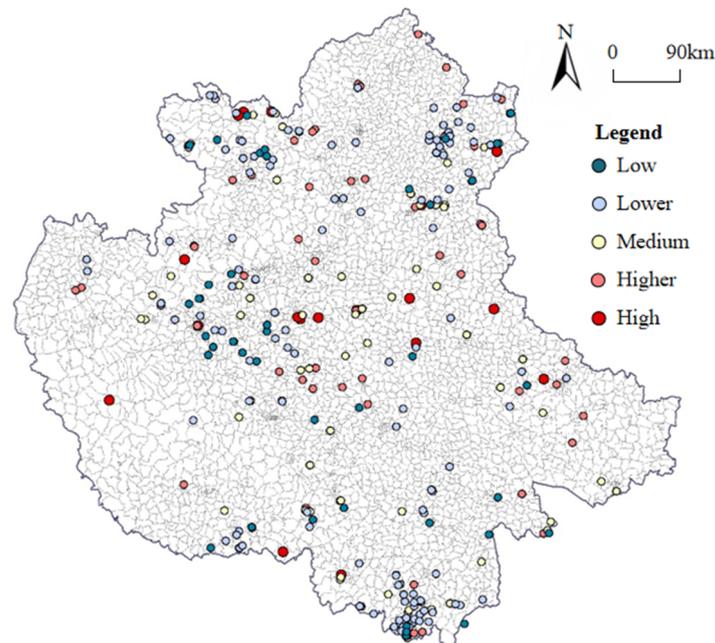


Figure 3. Classification of red tourism sites in the Central Plains region using the Jenks natural breaks method. Showing concentrated development in the south and east and relatively dispersed distribution in the north and central areas.

The development level of red tourism sites in the Central Plains region shows significant variation and can be classified into five categories: high, higher, medium, lower, and low. In terms of composition, the distribution follows a “rise-then-fall” pattern (Table 2). Among the 317 sites, only 20 belong to the high level, accounting for 6.3% of the total and representing a very small proportion. The higher and medium levels include 57 and 73 sites, respectively, with similar numbers. The lower level dominates with 127 sites, accounting for 40.1%, while the low level includes 40 sites, or 12.6%. These results indicate that the overall development level remains relatively low, with substantial room for improvement. Spatially, high-level sites are relatively evenly distributed, while higher and medium-level sites exhibit an uneven pattern, concentrated in the central and northern areas with fewer in the south. In contrast, lower and low-level sites show clear clustering in cities such as Zhengzhou, Xinyang, Liaocheng, and Changzhi.

Table 2. Top ten red tourism sites in the Central Plains region.

Rank	Scenic Site Name	Score	City
1	Zhengzhou Martyrs Cemetery	0.8227	Zhengzhou
2	Memorial Hall of Comrade Kong Fansen	0.7273	Liaocheng
3	Memorial Hall of Comrade Jiao Yulu	0.7259	Kaifeng
4	Erqi Memorial Tower	0.7145	Zhengzhou
5	Eighth Route Army Cultural Park	0.7136	Changzhi
6	Memorial Hall of the Eighth Route Army Taihang	0.7086	Changzhi
7	Huaihai Campaign Memorial Hall	0.7005	Yongcheng
8	Tongbai Revolutionary Memorial Hall	0.6614	Nanyang
9	Aoyuan Red Tourism Area in Luoyang	0.6507	Luoyang
10	Xinyang Revolution Museum in Soviet Area Capital	0.6476	Xinyang

To enhance the scientific validity of the conclusions, this study further analyzed the spatial distribution characteristics of scenic sites at the municipal scale. The results indicate that Zhengzhou and Xinyang in Henan Province, Liaocheng in Shandong Province, and Changzhi in Shanxi Province exhibit high scenic site densities, often accompanied by clusters of high-level sites. Zhengzhou, supported by favorable location and strong regional influence, presents a pattern of overall coordinated development. Xinyang forms a cluster in the southern region centered on the Eyu-Wan series of scenic sites. Liaocheng, as a revolutionary base area, is characterized by the Memorial Hall of Comrade Kong Fansen, with surrounding medium- and low-level sites distributed concentrically. Shanxi also serves as an important concentration of red cultural heritage, with distinct clusters along the Taihang Mountains, Lüliang Mountains, and the Yellow River corridor. In contrast, areas such as Yuncheng, Sanmenxia, southern Luoyang, and northern Nanyang show sparse distribution, with relatively low overall development levels and lagging tourism economies. Overall, the Central Plains region is rich in red tourism resources with diverse types. Future efforts should capitalize on these resource advantages by balancing the construction of physical scenic sites with online promotion, fostering regionally distinctive red tourism brands and high-quality routes, and strengthening cross-regional cooperation and resource integration to promote the sustainable and healthy development of red tourism.

3.2. Spatial Clustering Characteristics

To more clearly reveal the spatial distribution of red tourism sites in the Central Plains, the kernel density analysis method provided by ArcGIS software was applied to analyze the spatial distribution of 317 red tourism sites, in order to determine the clustering and dispersion patterns of these sites across different units in the region (Figure 4).

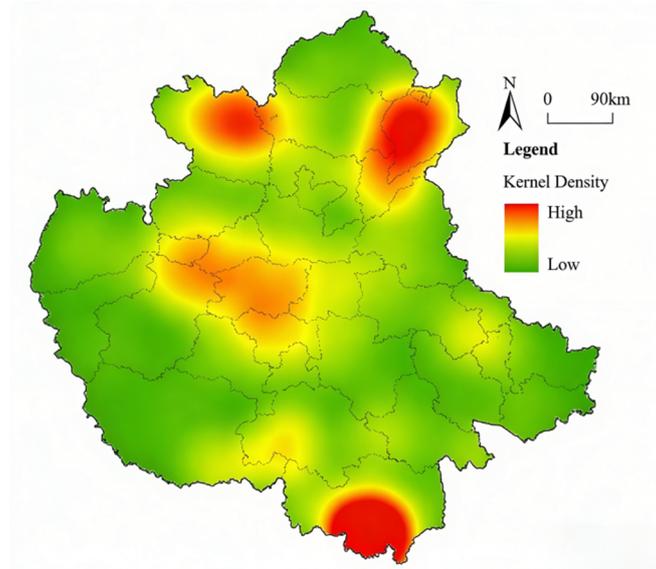


Figure 4. Kernel density analysis of red tourism sites in the Central Plains region. High-density clusters are mainly concentrated in Zhengzhou, Xinxiang, Anyang, and Xinyang, showing clear spatial aggregation patterns.

The spatial distribution of red tourism sites in the Central Plains region exhibits distinct density cores, with Xinyang in Henan Province standing out as the most prominent cluster. The overall pattern can be summarized as “one core, four clusters, and two linkages” (Figure 4). The core refers to the high-level concentration in Xinxian County of Xinyang, located in the hinterland of the Dabie Mountains at the Hubei–Henan border. Its central role is closely tied to advantageous location and profound historical background, making it the southern gateway of the Central Plains. The four clusters include two high-level concentrations centered in Changzhi of Shanxi and Liaocheng of Shandong, as well as two medium-level clusters at the Zhengzhou–Jiaozuo–Luoyang junction and the Zhumadian–Nanyang junction. The former two are mainly shaped by the abundant red cultural resources of revolutionary base areas, while the latter two are driven more by location advantages, transportation accessibility, and the influence of nearby high-level sites. The two linkages are distributed around the Shangqiu–Huaibei–Xuzhou junction and the Zhumadian–Fuyang junction, where the number of sites is relatively large but overall development remains weak due to geographical constraints and limited resource endowment. In general, although the formation mechanisms of these clusters vary, they are all strongly associated with the richness of red resources,

location and transportation advantages, and broader developmental context, which aligns well with the five-dimensional evaluation framework established in this study.

To ensure clarity and rigor, the spatial differentiation of scenic spots was first analyzed by applying the Jenks natural breaks method, which classified development levels into five categories. Based on this classification, the nearest neighbor index was employed to calculate the spatial proximity of scenic spots at different levels, thereby identifying their developmental status and spatial clustering patterns (Table 3).

Table 3. Nearest neighbor index of red tourism scenic spots at different development levels in the Central Plains.

Development Level	Number of Scenic Spots	\bar{r} (km)	r_T (km)	R	Spatial Clustering Type
High level	20	51.2491	45.3754	1.1294	Uniform type
Higher level	57	31.6202	34.5913	0.9141	Clustered type
Medium level	73	11.1173	16.1932	0.6865	Clustered type
Lower level	127	19.5746	27.7284	0.7059	Clustered type
Low level	40	27.6876	32.2063	0.8597	Clustered type

High-level scenic areas are evenly distributed in space, while higher, medium, lower, and low-level scenic areas all exhibit agglomeration patterns. The nearest neighbor index of higher-level scenic areas is slightly less than 1 but close to 1, indicating a tendency toward random distribution. When $R \leq 0.5$, the pattern is clustered; when $0.5 < R \leq 0.8$, the pattern is clustered–random. Thus, medium and lower-level scenic areas can be classified as clustered–random. In terms of distance features, the mean nearest neighbor distance, theoretical nearest neighbor distance, and nearest neighbor index of scenic areas at different levels follow a pattern of first decreasing and then increasing. Medium-level scenic areas have the lowest R value, indicating that spatial clustering weakens and then strengthens as the development level decreases. In terms of quantity, lower-level scenic areas are the most numerous, reflecting the overall abundance and concentrated distribution of red scenic areas in the Central Plains. However, most remain underdeveloped, leading to low development levels. This highlights the potential for joint development and collaboration among low-level scenic areas, which could help improve the overall development level.

Based on the analysis of the overall spatial structure of red tourism scenic areas in the Central Plains, the geographic concentration index was applied at the provincial scale to examine the local distribution types and development characteristics of red tourism scenic areas (Table 4).

Table 4. Geographic concentration index of red tourism scenic areas in five provinces of the Central Plains.

Provincial counts only reflect included cities with partial provincial coverage rather than full enumeration.

Region	Central Plains	Henan	Shanxi	Hebei	Anhui	Shandong
Geographic concentration index	64.4792	36.8459	82.5172	72.8869	48.9898	80.8901
Number of red tourism scenic areas	317	193	43	16	20	45

The geographic concentration index of red tourism scenic areas varies considerably across provinces, indicating uneven spatial distribution. Overall, the index for the Central Plains exceeds 50, reflecting a relatively concentrated spatial pattern. At the provincial level, the indices of Shanxi (82.52), Shandong (80.89), and Hebei (72.89) are much higher than those of other provinces, suggesting a clustered “core-aggregation” distribution, primarily concentrated in Changzhi (Shanxi), Liaocheng (Shandong), and Handan (Hebei). In contrast, Anhui and Henan exhibit lower index values, indicating a more dispersed “scattered” distribution of scenic areas.

In summary, the structural characteristics of development reveal that high-level scenic areas are few in number and evenly distributed, while low-level scenic areas are more numerous and exhibit significant clustering, forming a “high-even, low-clustered” pattern. Furthermore, although Henan has the largest number of red tourism scenic areas, its concentration index is the lowest, with substantial differences in the number, clustering degree, and development level of scenic areas across cities. Therefore, future tourism development should emphasize balanced and coordinated regional growth, improve the quality of red tourism scenic areas, and build a distinctive red cultural tourism brand in the Central Plains.

3.3. Spatial Association Feature

To further assess whether red tourism scenic areas in the Central Plains are correlated with their neighboring regions and to visualize their clustering characteristics and interdependencies, ArcGIS hotspot analysis was applied based on the overall development scores of the scenic areas to identify spatial hot and cold spots (Figure 5).

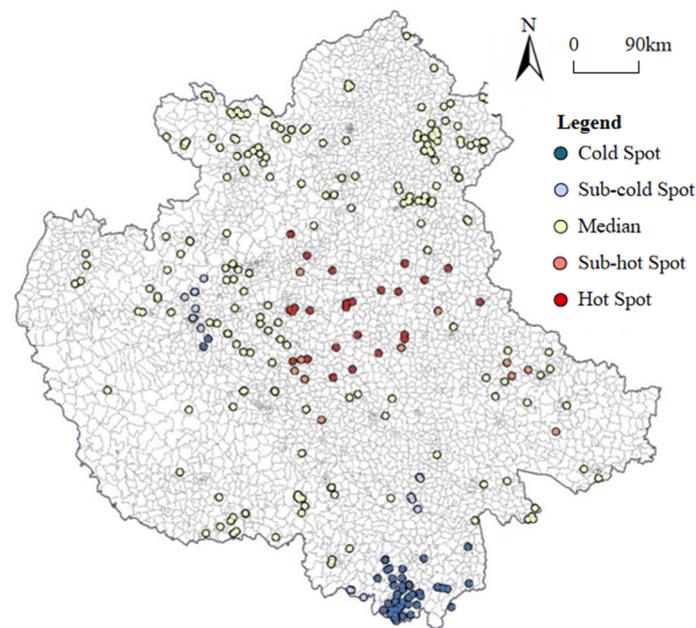


Figure 5. Hotspot analysis of red tourism resources in the Central Plains. The results reveal a clear spatial clustering pattern, with significant hotspots concentrated in the central region and distinct cold spots distributed in the southern and northern parts of the study area.

Red tourism sites in the Central Plains exhibit pronounced local spatial differentiation, with an overall pattern of one high cluster and two low clusters. The high cluster is centered in Kaifeng, extending across Kaifeng and its surrounding cities such as Zhengzhou, Xuchang, Xinxiang, and Heze. This area hosts a dense distribution of high-level sites that are closely linked with nearby higher-level sites, forming a large-scale hotspot zone. The two low clusters include a significant low-value area centered in Xinxian of Xinyang and a smaller low-value cluster in the northeastern part of Luoyang. Although these areas contain many sites with dense distributions, their overall quality is low, resulting in high-density but low-value clusters. In particular, Xinyang shows clear polarization, as the presence of a few high-level sites has not promoted the development of surrounding areas. Other parts of the region do not display significant hot or cold patterns, suggesting a relatively balanced mix of sites at different levels and weak regional interdependence. Overall, the spatial structure of red tourism sites presents a pattern of central hotspots and southern cold spots. Hotspots are concentrated in Kaifeng, Zhengzhou, and Xuchang, showing strong development momentum, while southern sites have yet to fully release their potential and need to enhance their development and build stronger linkages with high-level sites to transform cold spots into hotspots.

3.4. Analysis of Indicator Contributions and Associations

Analysis of the indicator weights shows that resource support accounts for the largest proportion in the evaluation system with a weight of 0.512, followed by regional support (0.261) and basic support (0.129), while government support (0.063) and new media support (0.033) have relatively small weight ratios. This indicates that the richness and integrity of red tourism resources are closely associated with the development level of scenic sites and are the core indicators contributing to the evaluation of development levels. A comparison of scores reveals that the top ten scenic sites scored on average 35% higher in resource-related indicators than the overall average, with resource richness and relic preservation making the most prominent contributions to the evaluation results.

In terms of regional support, the results of the nearest neighbor index show that the distribution of high-level scenic sites tends to be even, while medium and low-level scenic sites present obvious agglomeration characteristics, which reflects that locational advantages and regional coordination are closely associated with the development level of scenic sites and are important indicators contributing to regional differences in development. The geographic concentration index further highlights the regional differences in the agglomeration characteristics of scenic sites: Shanxi (82.52), Shandong (80.89) and Hebei (72.89) show a concentrated “core-aggregation” distribution pattern, while Henan (36.85) and Anhui (48.99) show a relatively dispersed distribution pattern. Such differences in spatial agglomeration characteristics are closely associated with the regional development potential of red tourism and contribute to the uneven distribution of development levels across provinces. Although government support and new media support have lower weight ratios in the evaluation system, they show positive

association with the development level of some high-level scenic sites and make important incremental contributions to their high scores. For example, the Jiao Yulu Memorial in Lankao and related red tourism institutions in Kaifeng show higher development evaluation scores, which is closely associated with targeted policy support and continuous online promotion. Statistical analysis shows that scenic sites with explicit government policy support have an average 18% higher evaluation score than those without relevant policy support, and scenic sites with stronger online influence also have significantly higher overall ranking in the comprehensive evaluation. This demonstrates that under the overall background of relatively low development level of red tourism scenic sites in the region, policy support and online publicity are positively associated with the improvement of scenic site evaluation scores and contribute to enhancing the visibility and evaluation performance of red tourism scenic sites.

In summary, the comprehensive evaluation score of red tourism scenic sites is closely associated with resource endowment and location conditions, which are the core indicators contributing to the development level evaluation; at the same time, policy support and online publicity are positively associated with the evaluation performance of high-level scenic sites and make important supplementary contributions to their advantages in the comprehensive evaluation. Future optimization of red tourism development layout should focus on three key directions: strengthening the protection and rational utilization of red tourism resources to enhance the core contribution of resource indicators to the development of scenic sites; improving transportation accessibility and regional cooperation mechanisms to reduce the regional differences in the contribution of location and regional support indicators; expanding the scope of online promotion and deepening the integration of culture and tourism to enhance the positive association between new media and policy support and the development level of scenic sites, so as to comprehensively improve the overall evaluation performance of regional red tourism scenic sites.

4. Discussion

This study evaluates the development level of 317 red tourism scenic areas in the Central Plains by using indicator scores and explores the causes of their spatial differentiation. The findings provide practical significance for further tapping into red tourism resources, revitalizing old revolutionary bases, and building a red tourism brand with regional characteristics. Compared with previous studies, this research adopts a five-dimensional framework and takes scenic areas as the basic units [39]. By ranking sites based on their indicator scores and analyzing their spatial distribution patterns, the study expands existing perspectives on scenic area evaluation, establishes an index system tailored to regional features, and contributes to the understanding of spatial characteristics while promoting integrated tourism development in the Central Plains. Moreover, the analysis of multiple influencing factors sheds light on their role and effectiveness in shaping development, offering theoretical support for exploring new development models. It should be noted, however, that some scenic areas are underdeveloped and their data difficult to obtain, leading to partial gaps in the dataset. In addition, the development levels identified through this evaluation can inform the design of high-quality tourism routes that enhance regional linkages.

Against the backdrop of rapid tourism growth, online promotion has become an indispensable tool for the development of red tourism, while hybrid strategies that integrate virtual and physical channels have emerged as essential pathways for outreach [40]. Several high-level sites have actively embraced this trend, using the Internet to pioneer new models of tourism, broaden market reach, and enhance vitality. As tourist demand grows more diverse and personalized, accurate market positioning and a deeper understanding of consumer preferences are increasingly required. Given the lag in supply–demand dynamics, scenic area development must anticipate future needs to ensure alignment with market expectations [41,42]. Although this study incorporated online data to adjust model parameters and thereby improved the reliability of the evaluation results to some extent, future research should make fuller use of such data. By simulating future scenarios or capturing dynamic changes in visitor behavior and publicity, online information can provide more accurate and timely assessments of red tourism scenic areas.

It is important to clarify that red tourism, particularly in the Chinese context, is conceptually distinct from the war museums and conflict-oriented heritage sites commonly found in many other countries. Rather than focusing primarily on armed conflict or historical trauma, red tourism in China is more closely associated with the transmission of collective memory, moral values, and revolutionary spirit through education-oriented and development-oriented practices. This distinction highlights the need for further scholarly attention to red tourism as a unique form of heritage, as existing research on this topic remains relatively limited compared to the extensive literature on war-related and memorial heritage.

5. Conclusions

This study examined 317 red tourism scenic areas in the Central Plains and developed an evaluation system covering five dimensions: basic support, resource support, regional support, government support, and new media support. Using spatial classification, spatial aggregation, and spatial correlation methods, the study evaluated the overall development level of the sites and analyzed their spatial distribution characteristics and influencing factors. The main conclusions are as follows:

The development levels of red tourism sites in the Central Plains region vary significantly and exhibit a clear stratified pattern. High-level sites, such as the Zhengzhou Martyrs Cemetery, the Kong Fansen Memorial, and the Jiao Yulu Memorial, are relatively evenly distributed, while low-level sites, such as the Jianchanghe Lenin Primary School site, are more concentrated. Overall, the spatial distribution presents a core area in Xinxian County of Xinyang City, with additional clusters in Changzhi, Liaocheng, Zhengzhou Jiaozuo Luoyang, and Zhumadian Nanyang, as well as smaller concentrations in the southeastern part of Shangqiu and the Zhumadian Fuyang junction. High-level sites show a nearest neighbor index close to one, reflecting an even distribution, whereas other levels demonstrate significant clustering, with clustering first weakening and then strengthening as development levels decrease. The geographic concentration indices vary substantially among provinces, indicating a structure where high-level sites are evenly distributed but low-level sites are strongly clustered. Hotspot analysis further reveals significant spatial associations, with Kaifeng emerging as a hotspot and cold spots appearing in Xinxian County of Xinyang and in northeastern Luoyang. Overall, the regional pattern is characterized by higher values concentrated in the center and lower values in the south.

Author Contributions

J.M.: Resources; Data Curation; Writing-Original Draft Preparation; Z.W.: Software; Validation; Formal Analysis; Writing-Review & Editing; Z.D.: Methodology; Supervision; Project Administration; Funding Acquisition. All authors have read and agreed to the published version of the manuscript.

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Data Availability Statement

The raw data supporting the conclusions of this article will be made available by the authors upon reasonable request.

Conflicts of Interest

The authors declare no conflict of interest.

Use of AI and AI-Assisted Technologies

No AI tools were utilized for this paper.

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