International Journal of World Economic Research
ISSN: 3080-9886 (Print), ISSN: 3080-9894 (Online) | Vol. 1, No. 1, 2026

Research on Online Attention to the Low-Altitude Economy in Shaanxi Province Based on Baidu Index

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Abstract: Against the background that the low-altitude economy has become a national strategic emerging industry, online attention has become a core indicator reflecting industrial development vitality and public awareness. Using Baidu Index as a measurement tool, this study adopts the keywords of "low-altitude economy", "low-altitude flight", "general aviation", and "unmanned aerial vehicle" to obtain daily search indices (PC + mobile) from January 1, 2020, to December 31, 2025. Monthly data from January 1, 2022, to December 31, 2025, are collected for 10 cities in Shaanxi Province, namely Xi'an, Baoji, Xianyang, Weinan, Yulin, Yan'an, Hanzhong, Ankang, Shangluo, and Tongchuan. Methods including spatial autocorrelation analysis, ordinary least squares (OLS), autocorrelation coefficient, and coefficient of variation are employed to quantitatively analyze the spatiotemporal evolution characteristics and influencing factors of online attention to the low-altitude economy in Shaanxi Province during 2020–2025. The results show that: 1) The temporal evolution of online attention to the low-altitude economy in Shaanxi Province presents a phased and continuous decline, with the decline rate accelerating gradually in three stages from 2020 to 2025, accompanied by a short-term periodic fluctuation of 90 days, while the annual periodicity is insignificant. Nevertheless, over the full-time scale of 2020–2025, the overall online attention to the low-altitude economy in Shaanxi Province still shows a significant upward trend. 2)In terms of spatial distribution, the Guanzhong region accounts for 65.08% of the total attention in the province. Xi'an is the only city with high attention, and the other nine cities are at the medium attention level. The inter-city coefficient of variation is 81.30%, indicating a medium difference level. Shaanxi Province generally presents a spatial pattern of "dominated by the Guanzhong region, with balanced and complementary development between northern and southern Shaanxi". 3)The global Moran's I analysis at the provincial scale shows that there is no significant spatial correlation in online attention to the low-altitude economy among the 10 prefecture-level cities. The attention characteristics of each city are mainly affected by local economic and industrial foundations, with weak radiation and driving effects among regions. The findings of this study can provide a scientific reference for the precise communication and industrial layout of the low-altitude economy in Shaanxi Province.

Keywords: Low-altitude economy; Online attention; Baidu Index; Shaanxi Province; Spatiotemporal characteristics.

1. Introduction

With the deep advancement of a new round of scientific and technological revolution and industrial transformation, emerging technologies represented by artificial intelligence, new energy, and the digital economy are continuously reshaping traditional economic structures, and the great changes unseen in a century are accelerating across the world[1].At present, China's economic development has entered a critical stage of high-quality development, with traditional growth drivers gradually weakening. Cultivating new drivers, opening up new sectors, and shaping new advantages have become core tasks to promote sustained and healthy economic development.

Against this background, under the guidance of Xi Jinping Economic Thought, China has thoroughly implemented the new development philosophy, vigorously promoted the deep integration of scientific and technological innovation and industrial innovation, fostered and expanded strategic emerging industries based on major technological breakthroughs and development demands, built new advantages for high-quality development, accelerated the formation of new-quality productive forces, and injected sustained impetus into high-quality economic development[2].

General Secretary Xi Jinping attaches great importance to the development of new-quality productive forces and has delivered important speeches and put forward clear requirements on many occasions. In 2023, the General Secretary first put forward the important concept of "new-quality productive forces" during an inspection tour. Later, through important occasions such as the Central Economic Work Conference and the collective study of the Political Bureau of the CPC Central Committee, he systematically elaborated on the core connotation, development significance, and practical path of new-quality productive forces [3].Under the overall layout of high-quality development led by new-quality productive forces, a large number of strategic emerging industries have developed rapidly. The low-altitude economy is a highly representative and growing field, which is the concrete and large-scale practice of new-quality productive forces in the airspace economy[4].With the maturity of low-altitude flight technology and the gradual liberalization of airspace management policies, the low-altitude economy has become a new engine for regional economic transformation and upgrading[2].

As an economic and transportation hub in Northwest China, Shaanxi Province has significant development potential in low-altitude logistics, low-altitude tourism, and other fields by virtue of its aerospace industry foundation, red tourism resources, general airport layout, and unique geographical advantages. Shaanxi is taking the low-altitude economy as a core focus to foster new-quality productive forces, and activating new drivers for the opening-up and economic transformation of inland Northwest China through the deep integration of airspace resource development and

industry[5].At present, Shaanxi has initially built a complete low-altitude economy industrial chain covering R&D and design, core components, complete machine manufacturing, and operation services. It is taking the low-altitude economy as a key starting point to cultivate new-quality productive forces and stimulate new momentum for inland opening-up and economic transformation in Northwest China[6].However, as a core indicator reflecting public attention and cognitive level toward specific fields, the spatiotemporal evolution of online attention can provide important references for industrial policy-making, communication strategy optimization, and spatial layout adjustment[7].

Relying on massive online search behavior data, Baidu Index can accurately capture the spatiotemporal dynamics and evolution of public attention, providing reliable data support and analytical tools for research on public cognition of emerging industries[8].In recent years, scholars have conducted many studies on technological innovation, industrial layout, and policy systems of the low-altitude economy, but quantitative research on public cognition is still relatively insufficient[9], especially systematic research on online attention to the low-altitude economy in inland provinces of Northwest China[7, 10].Therefore, based on Baidu Index data, this study systematically analyzes the spatiotemporal evolution of online attention to the low-altitude economy in Shaanxi Province. Theoretically, it enriches quantitative research methods in the low-altitude economy field, fills the gap in public cognition research in inland Northwest provinces, and provides a theoretical reference and paradigm for similar regional studies. Practically, by analyzing the spatiotemporal differentiation of online attention in Shaanxi and its cities, it provides accurate data support for formulating differentiated industrial communication strategies and optimizing industrial spatial layout. Meanwhile, targeted development suggestions are proposed based on spatiotemporal differences in attention, to promote the coordinated regional development of the low-altitude economy in Shaanxi and further enhance its role in fostering new-quality productive forces and promoting regional economic transformation and upgrading.

To accurately achieve the above research objectives and ensure scientificity and rigor, this study adopts an integrated multi-method research design, focusing on temporal analysis and spatial pattern analysis. For temporal characteristics, the ordinary least squares (OLS) method is used to conduct piecewise fitting of daily provincial and monthly municipal online attention data, and the accuracy of data processing is optimized by referring to the application experience of OLS in related studies[11], The autocorrelation coefficient method is used to identify phased trends and periodic fluctuations, and the lag term with the highest autocorrelation is used to characterize the periodicity of attention and clarify its driving factors.

For spatial pattern analysis, at the municipal, regional, and provincial scales, the classification method, coefficient of variation, and global Moran's I are adopted. The classification method takes the provincial monthly mean and standard deviation as benchmarks to divide cities into high, medium, and low attention levels, so as to clarify the distribution characteristics at the municipal scale [6]； The coefficient of variation is used to quantitatively measure the degree of difference and spatial equilibrium among cities and regions, providing a decision-making basis for coordinated industrial development.

2. Research Data and Methods

2.1. Research Data

The data in this study were obtained from the Baidu Index platform. Using "low-altitude economy", "low-altitude flight", "general aviation", and "unmanned aerial vehicle" as keywords, daily search indices (including PC and mobile terminals) from January 1, 2020, to December 31, 2025, were collected. Meanwhile, monthly search indices from 2022 to 2025 were obtained for 10 core cities in Shaanxi Province, namely Xi'an, Baoji, Xianyang, Weinan, Yulin, Yan'an, Hanzhong, Ankang, Shangluo, and Tongchuan. Among them, the provincial daily data cover the complete time series from 2020 to 2025, which is used to systematically depict the temporal evolution process and periodic characteristics of online attention to the low-altitude economy in Shaanxi Province. The monthly data at the municipal level are selected from 2022 to 2025, mainly because after the release of the 14th Five-Year Plan for Civil Aviation Development in Northwest China[12]in 2022, the development of the low-altitude economy in Shaanxi Province entered a policy-driven stage. With the advancement of low-altitude economy-related conferences and industrial layout, each city has gradually shown significant spatial differentiation in industrial layout and public attention relying on its aviation foundation, tourism resources, and airspace conditions. In addition, the municipal-level Baidu Index data during this period are highly complete, which can more accurately reflect the spatial differentiation pattern of attention.

2.2. Research Methods

2.2.1. Temporal Characteristic Analysis

This study adopts the Ordinary Least Squares (OLS) method and autocorrelation coefficient method, combined with the time series data of daily provincial-level and monthly municipal-level online attention to the low-altitude economy in Shaanxi Province, to systematically analyze its temporal evolution characteristics. The specific methods, principles, and operation processes are as follows:

(1) Ordinary Least Squares (OLS)

Ordinary Least Squares (OLS) is a statistical method used to solve linear regression equations. Its core is to determine the coefficients of the regression equation by minimizing the sum of squared residuals between the observed values and fitted values of the dependent variable, thereby quantifying the linear relationship between the independent variable and the dependent variable. The principle is as follows: assuming that time (t) is the independent variable and online attention to the low-altitude economy (y) is the dependent variable, there is a linear relationship between the two, and the basic regression fitting equation is constructed as follows:

$$y=at+b+\varepsilon$$

Among them, a is the slope, reflecting the change rate of attention; b is the intercept; ε is the random error term, which follows a normal distribution. The optimal estimated values of a and b are solved by minimizing the sum of squared residuals:

$$\sum_{i=1}^{n}(y_i-\hat{y}_i)$$

where y_i is the observed value and $\hat{y}_i$ is the fitted value. Then, the fitting effect and change trend are judged by

relevant indicators.

In this study, the operation process includes the following steps: First, sort out the daily provincial-level online attention data of the low-altitude economy in Shaanxi Province from 2020 to 2025 and the monthly municipal-level attention data, and clarify the time dimension and data scope. Second, combined with the actual fluctuation characteristics of attention, divide the daily provincial-level data from 2020 to 2025 into 3 evolution stages. For each stage, take time (t) as the independent variable and attention (y) as the dependent variable to construct the above linear fitting equation. Finally, calculate the slope a, coefficient of determination R^2, and significance P value of the fitting equation for each stage. Among them, the slope a represents the change trend of attention in this stage (a>0 for an upward trend, a<0 for a downward trend, and a=0 for a stable trend); R^2 (ranging from 0 to 1) reflects the fitting effect of the fitting equation (the closer R^2 is to 1, the better the fitting effect); the P value (usually with 0.05 as the critical value) judges the statistical significance of the regression relationship ($P<0.05$ for significant, $P\geq0.05$ for insignificant). Finally, the phased characteristics of temporal evolution are clarified.

(2) Autocorrelation Coefficient Method

The autocorrelation coefficient method is a statistical method for analyzing the autocorrelation of time series data. It is used to measure the correlation degree between data at different lag terms (i.e., different time points) in the same time series, so as to identify the periodic characteristics of time series data. Its principle is as follows: the autocorrelation coefficient (ACF) ranges from [-1, 1]. When the autocorrelation coefficient is positive and close to 1, it indicates that the attention at the time point corresponding to the lag term has a strong positive correlation with the attention at the current time point; when the autocorrelation coefficient is negative and close to -1, it indicates a strong negative correlation; when the autocorrelation coefficient is close to 0, it indicates no obvious correlation. By calculating the autocorrelation coefficients of different lag terms, the lag term with the highest autocorrelation (the absolute value is closest to 1) is found. The time length of this lag term is the main period of attention, so as to reveal its fluctuation law and temporal drivers.

The operation process in this study is as follows:

First, data preprocessing is performed. This processing is only for the daily provincial-level online attention data of the low-altitude economy in Shaanxi Province, including operations such as eliminating outliers and filling in missing values to ensure data integrity. Second, combined with the characteristics of daily data, set the lag terms to 1–30 days, and use the autocorrelation coefficient formula:

$$ACF(k)=\frac{\sum_{t=n+1}^{n}(y_t-\bar{y})(y_{t-k}-\bar{y})}{\sum_{t=1}^{n}(y_t-\bar{y})^2}$$

to calculate the autocorrelation coefficient corresponding to each lag term. Next, by comparing the autocorrelation coefficients of all lag terms, select the lag term corresponding to the autocorrelation coefficient with the largest absolute value, and use this lag term to characterize the periodic characteristics of attention. Finally, combined with the policies, industry events, etc., during the research period, analyze the temporal drivers of periodic fluctuations.

2.2.2. Spatial Pattern Analysis

From the three scales of municipal, regional, and provincial levels, this study sequentially adopts the hierarchical classification method, coefficient of variation method, and Global Morans I method, combined with the online attention data of the low-altitude economy in 10 prefecture-level cities of Shaanxi Province, to analyze their spatial distribution, differences, and agglomeration characteristics. The specific methods, principles, and operation processes are as follows:

(1) Hierarchical Classification Method

The hierarchical classification method is a classification method based on the statistical characteristics of data. By setting reasonable critical values, the research objects are divided into different levels, thereby clearly presenting the spatial distribution differences of the research objects. Its principle is to take the monthly average value ($\bar{x}$) and standard deviation (s) of online attention to the low-altitude economy of all research units in the study area (10 prefecture-level cities in Shaanxi Province in this paper) as the core statistical indicators, set critical values through the combination of the average value ($\bar{x}$) and standard deviation (s), and distinguish the differences in attention levels among different units by using the degree of data dispersion.

Among them, the formula for calculating the average value is:

$$\bar{x}=\frac{1}{n}\sum_{i-1}^{n}x_i$$

where n is the number of research units (n=10 in this study), and x_i is the monthly average attention of the i-th prefecture-level city. The formula for calculating the standard deviation is:

$$s=\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})^2}$$

where n is the number of research units, x_i is the monthly average attention of the i-th prefecture-level city, and $\bar{x}$ is the average value of the monthly average attention of the 10 prefecture-level cities in the province.

The operation process in this study is as follows:

First, sort out the monthly online attention data of the low-altitude economy in 10 prefecture-level cities of Shaanxi Province, calculate the monthly average attention of each prefecture-level city, and then calculate the provincial monthly average attention mean ($\bar{x}$) and standard deviation (s) based on the monthly average attention of all prefecture-level cities. Second, set critical values: the high attention level is monthly average attention $\geq \bar{x}+s$, the medium attention level is $\bar{x}-s<$ monthly average attention $<\bar{x}+s$, and the low attention level is monthly average attention $\leq \bar{x}-s$. Based on this, the 10 prefecture-level cities are divided into three attention levels: high, medium, and low. Finally, count the number and proportion of prefecture-level cities at each level, and clarify the distribution characteristics of online attention to the low-altitude economy at the municipal scale combined with the geographical spatial distribution.

(2) Coefficient of Variation Method

The Coefficient of Variation (cv) is a standardized statistical method used to measure the degree of data dispersion. It can eliminate the influence of data dimensions, quantitatively reflect the degree of difference among research units, and then judge the spatial equilibrium.

Its principle is: the calculation formula of the coefficient of variation is:

$$cv=\frac{s}{\bar{x}}\times100\%$$

Where s is the standard deviation of the attention data of the research units, and $\bar{x}$ is the average value of the attention

data of the research units. A larger cv value indicates greater differences in attention among research units and worse spatial equilibrium; a smaller cv value indicates smaller differences and better spatial equilibrium.

The operation process in this study is as follows:

First, take the 10 prefecture-level cities of Shaanxi Province as research units, sort out the online attention data of the low-altitude economy in each city (the same data as used in the hierarchical classification method), and calculate the average value ($\bar{x}$) and standard deviation (s) of attention of all prefecture-level cities. Second, substitute into the above formula to calculate the coefficient of variation (cv) value. Finally, combined with the size of the cv value, quantitatively judge the degree of attention difference and spatial equilibrium at the municipal scale (among the 10 prefecture-level cities) and regional scale (within and between the three major regions of Northern Shaanxi, Guanzhong, and Southern Shaanxi), and clarify the spatial difference characteristics at different scales.

(3) Global Morans I Method

The Global Morans I method is a spatial statistical method used to measure the spatial correlation of regional variables. It can quantitatively judge the spatial agglomeration and correlation characteristics of research units at the provincial scale and reveal the radiation and driving effects among regions. Its calculation formula is:

$$I=\frac{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}(x_i-\bar{x})(x_j-\bar{x})}{\sum_{i=1}^{n}\sum_{j=1}^{n} w_{ij}\sum_{i=1}^{n}(x_i-\bar{x})^2}$$

where n is the number of research units, x_i and x_j are the attention values of the i-th and j-th prefecture-level cities respectively, $\bar{x}$ is the average attention value of all research units, and w_{ij} is the element of the spatial weight matrix (indicating the spatial adjacency relationship between the i-th and j-th prefecture-level cities, 1 for adjacent and 0 for non-adjacent).

Its principle is that the Global Morans I ranges from [-1, 1]. The core principle is to judge the type of spatial correlation by comparing the attention of the research unit itself with the average attention of surrounding units:

①When I>0 and significant, it indicates a positive spatial correlation of attention, that is, high-attention areas are mostly surrounded by high-attention areas (high-high agglomeration), and low-attention areas are mostly surrounded by low-attention areas (low-low agglomeration);

②When I<0 and significant, it indicates a negative spatial correlation of attention, that is, high-attention areas are mostly surrounded by low-attention areas (high-low agglomeration), and low-attention areas are mostly surrounded by high-attention areas (low-high agglomeration);

③When I≈0, it indicates that the attention is randomly distributed in space with no obvious agglomeration characteristics.

The significance of spatial correlation is jointly determined by the Morans I value, Z value, and P value. The Z value is used to test the statistical significance of the I value, and its calculation formula is:

$$Z(I)=\frac{I-E(I)}{\sqrt{Var(I)}}$$

where E(I) is the mathematical expectation of the Global Morans I, and Var(I) is the variance of the Global Morans I; the P value (with 0.05 as the critical value) further verifies the reliability of the correlation.

The operation process in this study is as follows:

First, sort out the online attention data of the low-altitude economy in 10 prefecture-level cities of Shaanxi Province, and construct a spatial weight matrix (used to measure the spatial adjacency relationship between each city) combined with the geographical coordinates of each city. Second, with the help of GeoDa software, set the number of permutations to 999 (to improve the reliability of statistical results), input the attention data and spatial weight matrix, and calculate the Global Morans I value, Z value, and P value. Finally, according to the sign and size of the I value, judge the spatial agglomeration type of attention of the 10 prefecture-level cities at the provincial scale, and determine the significance of spatial correlation combined with the Z value and P value (P<0.05 for significant), so as to clarify the radiation and driving effects among regions (such as the positive radiation of high-high agglomeration areas on surrounding regions, and the development lag of low-low agglomeration areas).

3. Spatiotemporal Characteristics of Online Attention to the Low-Altitude Economy in Shaanxi Province

3.1. Temporal Evolution Characteristics

The temporal evolution of online attention to the low-altitude economy in Shaanxi Province presents characteristics of phased decline and periodic fluctuation. There are significant differences in the trend changes of the three stages from 2020 to 2025, and public attention shows a significant short-term periodic law.

3.1.1. Stage Division

This study divides the daily provincial-level online attention to the low-altitude economy in Shaanxi Province from 2020 to 2025 into three stages: 2020–2021, 2022–2023, and 2024–2025. The ordinary least squares (OLS) method is used for piecewise fitting, and the trend comparison of the three stages is shown in Figure.

It can be seen from the fitting results that the slopes of the three stages are all negative and their absolute values gradually increase (the slope is -0.022 for 2020–2021; -0.034 for 2022–2023; -0.045 for 2024–2025), indicating that the online attention to the low-altitude economy in Shaanxi Province showed a continuous downward trend from 2020 to 2025, and the decline rate accelerated gradually. The P values of each stage are all less than 0.001, indicating that the downward trend of each stage is statistically significant.

In terms of fitting explanatory power, during 2022–2023, R^2=0.157, which is the highest among the three stages, indicating that the change trend of attention in this stage is more stable and more driven by policies and industrial development. The R^2 values in 2020–2021 and 2024–2025 are relatively low, 0.070 and 0.083 respectively, indicating that public attention to the low-altitude economy in these two stages is more affected by accidental factors, and the attention fluctuation is more obvious. Among them, 2020–2021 was the preliminary exploration stage of the low-altitude economy development in Shaanxi Province, with low public awareness and scattered attention; in 2024–2025, the industrial layout of various cities was gradually implemented, and the regional differences in attention led to increased fluctuations in the overall provincial attention.

It should be noted that although each stage shows a

downward trend, from the full time scale of 2020–2025, through the linear fitting of the annual average value (Figure 2), it can be found that the overall online attention to the low-altitude economy in Shaanxi Province still shows a significant upward trend. This long-term upward trend is highly consistent with the background of the continuous advancement of low-altitude economy policies, the gradual implementation of industrial projects, and the continuous deepening of public cognition in Shaanxi Province, reflecting that the social attention to this field has been effectively improved in the long-term dimension.

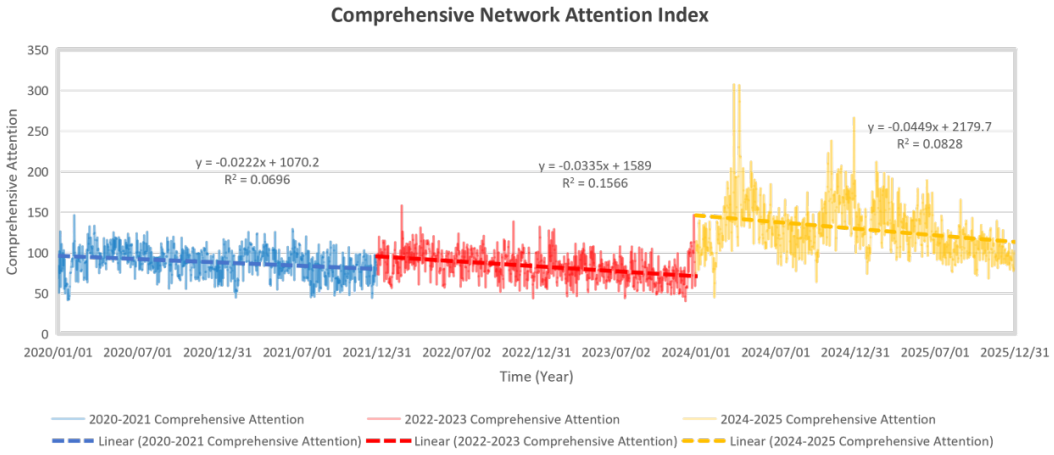

Figure 1. Comparison of the Three-Stage Trends of Online Attention to the Low-Altitude Economy in Shaanxi Province from 2020 to 2025

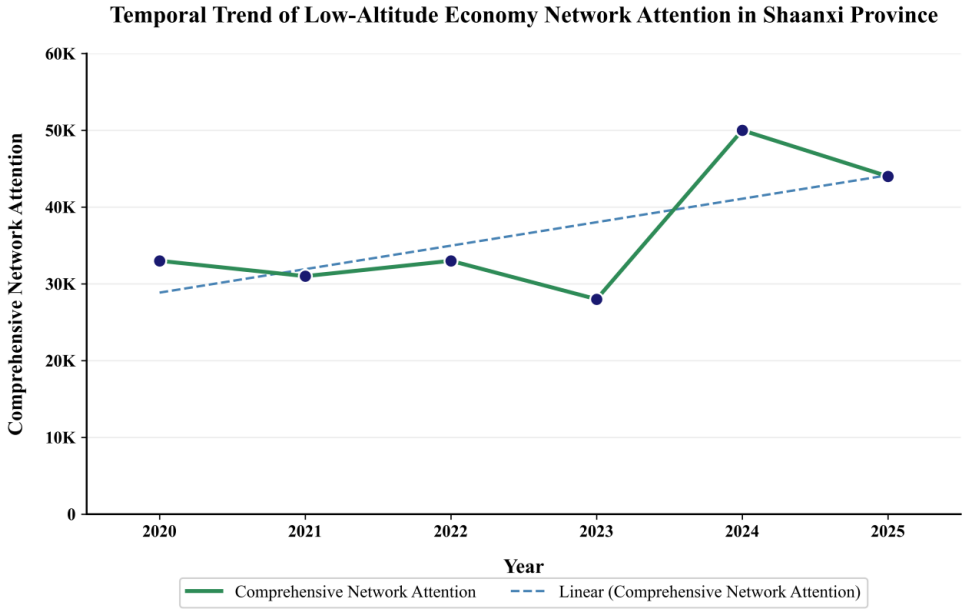

Figure 2. Annual Average Value and Overall Trend of Comprehensive Online Attention to the Low-Altitude Economy in Shaanxi Province from 2020 to 2025

3.1.2. Periodic Characteristics

This study analyzes the periodic fluctuation characteristics by calculating the autocorrelation coefficient of the daily provincial-level online attention to the low-altitude economy in Shaanxi Province, and the results are shown in Table 1.

Table 1. Autocorrelation Coefficient Table of Online Attention to the Low-Altitude Economy in Shaanxi Province

Lag Term (Days)	Autocorrelation Coefficient
0	1
90	0.436824953
365	0.118245689

The autocorrelation coefficient results show that the autocorrelation coefficient with a lag of 90 days is 0.4368, which is significantly higher than 0.1182 with a lag of 365 days, indicating that the online attention to the low-altitude economy in Shaanxi Province has a short-term periodic fluctuation of about 90 days, while the annual periodic characteristic is not significant. This characteristic reflects that public attention to the low-altitude economy is quarterly, which is closely related to short-term events such as the release of policies, industrial activities, and project implementation related to the low-altitude economy. However, the seasonal impact at the annual level is weak, which also indicates that the low-altitude economy in Shaanxi Province has not yet formed stable annual attention hotspots, and the cultivation of public cognition of the industry still needs to be strengthened.

3.2. Spatial Distribution Pattern

Based on the monthly data of online attention to the low-altitude economy in 10 cities of Shaanxi Province from 2022 to 2025, this study analyzes the spatial distribution pattern from three aspects: attention level classification, regional differences, and spatial agglomeration. The core data are derived from the monthly average data, total data during the

research period, and regional aggregated data of online attention to the low-altitude economy in 10 cities of Shaanxi Province.

3.2.1. Municipal Scale

Taking the provincial monthly average attention (3170.62) and standard deviation (2577.69) as the benchmarks, this study calculates the critical values of attention levels:

① High attention ≥ 5748.31;

② Medium attention: 592.92–5748.31;

③ Low attention ≤ 592.92;

Combined with the monthly average attention data of 10 cities in Shaanxi Province, the attention level classification is completed, and the total attention of each city during the research period and its proportion in the province are counted. The results are shown in Table 2.

Table 2. Ranking and Level Classification of Online Attention to the Low-Altitude Economy in 10 Cities of Shaanxi Province

City Name	Regional Belonging	Monthly Average Attention	Ranking	City Name	Regional Belonging	Monthly Average Attention	Ranking
City Name	Regional Belonging	9901.81	1	High Attention	475287	31.23	Medium Proportion (5%-20%)
Xian	Guanzhong	4359.65	2	Medium Attention	209263	13.75	Medium Proportion (5%-20%)
Xianyang	Guanzhong	3123.00	3	Medium Attention	149904	9.85	Medium Proportion (5%-20%)
Yulin	Northern Shaanxi	3025.85	4	Medium Attention	145241	9.54	Medium Proportion (5%-20%)
Weinan	Guanzhong	2652.81	5	Medium Attention	127335	8.37	Medium Proportion (5%-20%)
Baoji	Guanzhong	2505.58	6	Medium Attention	120268	7.90	Medium Proportion (5%-20%)
Yanan	Northern Shaanxi	2448.42	7	Medium Attention	117524	7.72	Low Proportion (<5%)
Hanzhong	Southern Shaanxi	1710.77	8	Medium Attention	82117	5.40	Low Proportion (<5%)
Ankang	Southern Shaanxi	1283.88	9	Medium Attention	61626	4.05	Medium Proportion (5%-20%)
Shangluo	Southern Shaanxi	694.40	10	Medium Attention	33331	2.19	Medium Proportion (5%-20%)

From the perspective of the level classification results, among the 10 cities in Shaanxi Province, only Xian is a high-attention city, and the other 9 cities are medium-attention cities, with no low-attention cities. This indicates that the attention of all cities in Shaanxi Province to the low-altitude economy has reached a certain level, and there are no regions with serious lack of attention. As the capital of Shaanxi Province, Xian is the core of the provinces economy, science and technology, and industry, with a solid aerospace industrial foundation and concentrated implementation of low-altitude economy-related policies and projects, making it the only high-attention city in the province. Its monthly average attention reaches 9901.81, far exceeding the critical value of high attention, and its total attention during the research period accounts for 31.23% of the province, becoming the core of public attention to the low-altitude economy in the province.

From the perspective of proportion characteristics, only Xian enters the high proportion interval (≥20%), 7 cities including Xianyang, Yulin, and Weinan are in the medium proportion interval (5%-20%), and Shangluo and Tongchuan are in the low proportion interval (<5%). Xianyang, Weinan, and Baoji in the Guanzhong region are all among the top 5 in the attention ranking, Yulin and Yanan in Northern Shaanxi are ranked 6–7, and Hanzhong, Ankang, and Shangluo in Southern Shaanxi are ranked 8–9. This reflects that the attention ranking at the municipal scale is highly related to the regional economic development level and industrial foundation.

3.2.2. Regional Scale

Shaanxi Province is divided into three major regions: Guanzhong, Northern Shaanxi, and Southern Shaanxi. The total attention of each region during the research period, its proportion in the province, and the structure of attention cities are counted, and the results are shown in Table 3. At the same time, the cv (Coefficient of Variation) of online attention to the low-altitude economy in 10 cities of Shaanxi Province is calculated to be 81.30%. According to the judgment standard, 81.3% ≤ cv < 100% is a medium difference level, indicating that the spatial difference of online attention to the low-altitude economy in Shaanxi Province is at a medium level, and the spatial distribution presents the characteristics of "relatively balanced but with prominent core".

Table 3. Characteristics of Online Attention to the Low-Altitude Economy in Three Major Regions of Shaanxi Province

Region	Total Attention During Research Period	Proportion in the Province (%)	Number of High-Attention Cities	Region	Total Attention During Research Period
Guanzhong	990457	65.08	1	4	0
Northern Shaanxi	270172	17.75	0	2	0
Southern Shaanxi	261267	17.17	0	3	0

From the perspective of the total regional scale, the Guanzhong region is in an absolute dominant position, with a

total attention of 990457 during the research period, accounting for 65.08% of the province, far exceeding Northern Shaanxi (17.75%) and Southern Shaanxi (17.17%). Moreover, the Guanzhong region has Xian , the only high-attention city in the province, and the other 4 cities (Xianyang, Weinan, Baoji, Tongchuan) are all medium-attention cities, forming an attention structure of "1 core and 4 supplements". This is highly consistent with the positioning of the Guanzhong region as the core layout area of the low-altitude economy industry in Shaanxi Province[13].

From the comparison between Northern Shaanxi and Southern Shaanxi, the total attention proportions of the two regions are similar, both around 17%. Yulin and Yanan in Northern Shaanxi, and Hanzhong, Ankang, and Shangluo in Southern Shaanxi are all medium-attention cities. Among them, Yulins monthly average attention ranks 3rd in the province, becoming the attention core of Northern Shaanxi, and Hanzhong is the attention core of Southern Shaanxi. Both regions have formed a single-core attention structure, but the overall attention level is far lower than that of the Guanzhong region, and the results are shown in Figure 5.

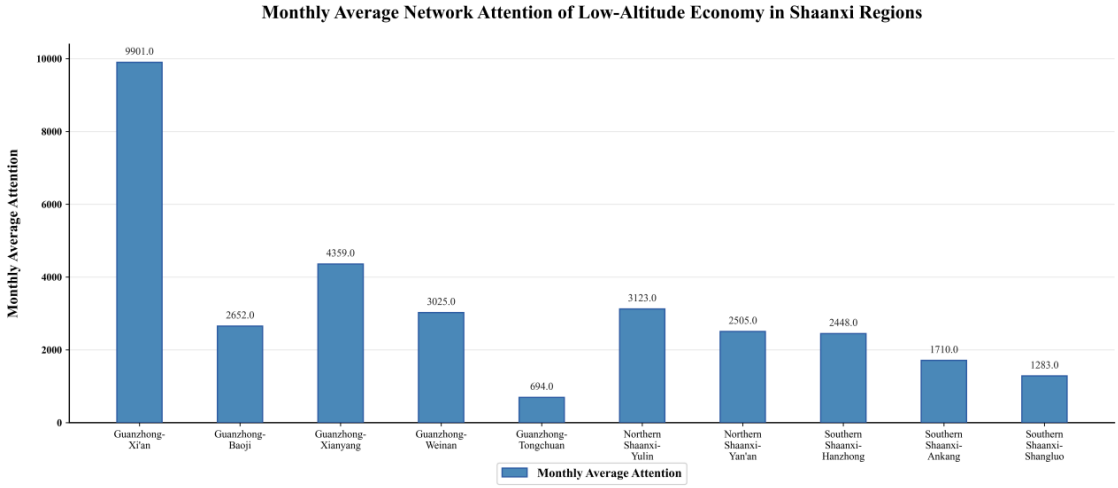

Figure 3. Ranking of Monthly Average Online Attention to the Low-Altitude Economy in 10 Cities of Shaanxi Province

From the perspective of spatial differences, the coefficient of variation of 81.30% is a medium difference level, indicating that the attention difference among the 10 cities in Shaanxi Province has not reached a high difference level. Except for Xian, the monthly average attention of the other 9 cities is in the medium attention interval, and the numerical gap is relatively small. This reflects that the public attention to the low-altitude economy in Shaanxi Province has a certain balance at the municipal scale, and there is no serious polarization.

3.2.3. Provincial Scale

This study uses the Global Morans I to analyze the spatial agglomeration characteristics of online attention to the low-altitude economy in 10 cities of Shaanxi Province, with a sample size of n=10. The calculation is carried out by Geo Da software with 999 permutations. The core calculation results and spatial correlation judgment are shown in Table 4, and the Morans I calculation results and significance test c hart are shown in Figure 4.

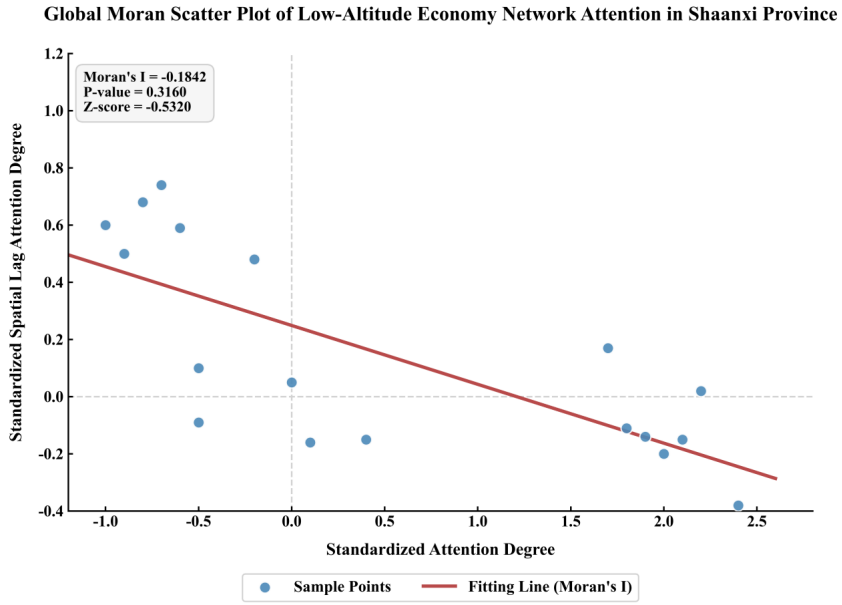

Figure 4. Moran's I Calculation Results and Significance Test Chart

Table 4. Global Moran's I Analysis Table of Online Attention to the Low-Altitude Economy in 10 Cities of Shaanxi Province

Morans I Value	Expected I Value E(I)	Z Value	P Value	Confidence Level	Spatial Correlation Judgment
-0.1842	-0.111	-0.5320	0.3160	95%	No Significant Spatial Correlatio

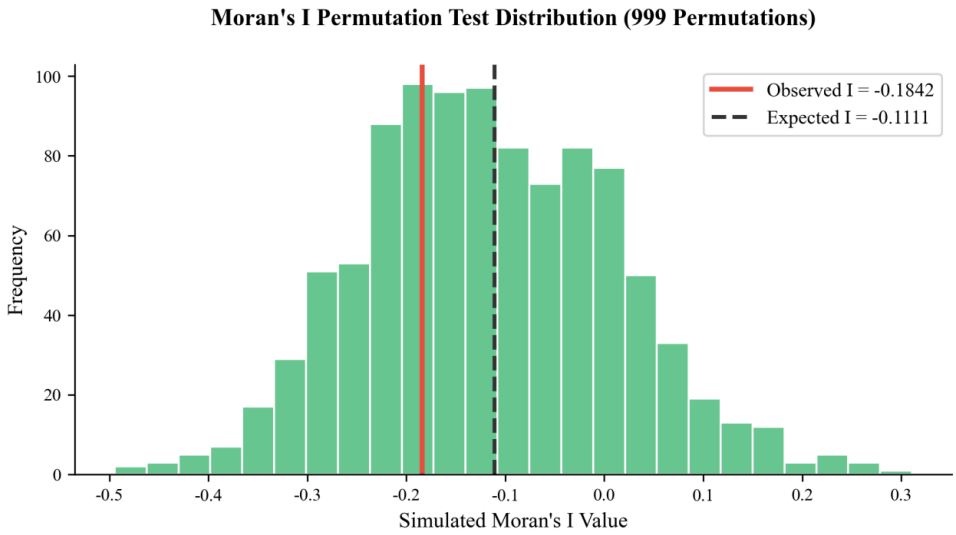

Figure 5 Monte Carlo Simulation Test Chart of Global Moran's I

The Global Morans I results show that the I value is -0.1842, slightly lower than the expected I value (-0.111), indicating that there is a weak negative spatial correlation in the online attention to the low-altitude economy in 10 cities of Shaanxi Province. However, the Z value is -0.5320 and the P value is 0.3160. At the 95% confidence level, the P value is much greater than 0.05, so it is determined that there is no significant spatial correlation in the online attention to the low-altitude economy in 10 cities of Shaanxi Province.

This characteristic indicates that the public attention to the low-altitude economy in Shaanxi Province has not formed an obvious spatial agglomeration effect, that is, there are no agglomeration areas with high attention around cities with high attention, and no agglomeration areas with low attention around cities with low attention. The public attention of each city is mainly affected by local factors such as its own economic development level, industrial foundation, and policy implementation, and the radiation and driving effect among regions is weak. This is also an urgent problem to be solved for the coordinated regional development of the low-altitude economy in Shaanxi Province.

4. Discussion

4.1. Development Suggestions

Combined with the spatiotemporal characteristics of online attention to the low-altitude economy in Shaanxi Province and the actual situation of industrial development, this study puts forward targeted development suggestions from two dimensions: temporal guidance and spatial layout, aiming at solving the problems such as the continuous decline of public attention, insufficient regional coordination, and weak core radiation. The purpose is to improve public awareness of the low-altitude economy, optimize industrial spatial layout, promote coordinated regional development, and provide practical support for cultivating new quality productive forces in the low-altitude economy of Shaanxi Province.

4.1.1. Grasp the Short-Term Cycle Law and Implement Phased Temporal Guidance Strategies

Based on the short-term periodic characteristic of 90 days of online attention to the low-altitude economy in Shaanxi Province, this study formulates phased and precise industrial publicity and activity implementation strategies combined with quarterly time nodes to activate sustained public attention. At the beginning of the quarter, focus on policy interpretation and industrial planning release, popularize the development orientation, key areas, and implemented projects of the low-altitude economy in Shaanxi Province to the public through government official websites, local integrated media and other platforms, and strengthen industrial cognition. In the middle of the quarter, carry out characteristic industrial experience activities, such as UAV performances, low-altitude tourism test rides, general aviation science popularization exhibitions, etc., and combine with industry events such as the Xian Air Show to create offline experience hotspots, transforming public attention from "online search" to "offline participation". At the end of the quarter, conduct an inventory of industrial development achievements, show the application effects of the low-altitude economy in logistics, tourism, emergency rescue and other fields through data and cases, enhance public awareness of the industrial development value, and form a quarterly closed loop of "policy release - activity experience - achievement feedback" to solve the problems of short-term and fluctuating industrial attention. At the same time, in response to the continuous decline of attention, explore the combination points between the low-altitude economy and Shaanxis local characteristics[14, 15], such as integrating low-altitude tourism with Northern Shaanxis red culture, Southern Shaanxis ecological culture, and Guanzhongs historical culture, and create a low-altitude economy IP with Shaanxis recognition IP[16], to enhance the long-term attractiveness of the industry.

4.1.2. Rely on Spatial Differentiation Characteristics and Optimize the Differentiated Spatial Development Layout

Combined with the spatial pattern of "Guanzhong leading, Northern and Southern Shaanxi balanced and complementary", this study formulates differentiated low-altitude economy development and communication strategies according to the industrial foundation and resource endowments of the three major regions and different cities, so as to achieve "core leadership and each giving full play to its strengths" [17, 18].

1) Guanzhong Region: Strengthen the core leading role of Xian. Relying on its aerospace industrial foundation, focus

on developing high-end formats such as low-altitude R&D and manufacturing, and low-altitude operation services, and build Xian into the northwest low-altitude economy industrial center and public cognition core[19], Further improve its attention and radiation capacity by building a low-altitude economy science popularization museum and creating a low-altitude economy demonstration block [20], Relying on their geographical proximity to Xian, Xianyang, Weinan, and Baoji develop supporting low-altitude logistics, low-altitude tourism transfer and other formats. Tongchuan focuses on developing characteristic fields such as low-altitude emergency rescue and agricultural and forestry plant protection, forming a "1 core and 4 supplements" industrial pattern complementary to Xian. At the same time, with the help of Xians publicity re sources, realize the linked improvement of public cognition[21].

2) Northern Shaanxi Region: Take Yulin as the core, rely on its energy industrial foundation to develop low-altitude energy inspection, UAV mapping and other formats, and combine with Northern Shaanxis red tourism resources to create red low-altitude tourism routes. Yanan focuses on developing fields such as red low-altitude research and study, and ecological monitoring, and holds activities such as the Red Low-Altitude Tourism Festival to improve public attention to the regional low-altitude economy, forming the Northern Shaanxi low-altitude economy characteristic of "energy + tourism".

3) Southern Shaanxi Region: Take Hanzhong as the core, rely on the advantages of Southern Shaanxis ecological resources to focus on developing low-altitude ecological tourism, health care flight and other formats, and create the Southern Shaanxi ecological low-altitude economy brand. Combined with the mountainous terrain characteristics, Ankang and Shangluo develop low-altitude outdoor sports, emergency rescue and other fields, and use the traffic advantages of Southern Shaanxis ecological tourist attractions to carry out low-altitude economy experience activities, realizing the integrated development of "ecological tourism + low-altitude economy"[22, 23]and improving regional public cognition.

4.2. Research Limitations

Taking Baidu Index as the core data, this study analyzes the spatiotemporal characteristics of online attention to the low-altitude economy in Shaanxi Province and provides a reference for industrial development. However, limited by data acquisition and research methods, there are still the following three limitations:

1) Relatively single data dimension: This study only selects the search data of Baidu Index to characterize online attention, and does not integrate interaction data from social media platforms (such as Douyin, Weibo, Xiaohongshu), report data from news media, and participation data from offline industrial activities. It is difficult to fully reflect the overall picture of public cognition of the low-altitude economy in Shaanxi Province, and the attention differences among different age groups and occupational groups are not considered, so the comprehensiveness of the research results needs to be improved.

2) Insufficient in-depth analysis of influencing factors: This study focuses on analyzing the spatiotemporal characteristics of online attention to the low-altitude economy in Shaanxi Province, but does not further construct a quantitative model to analyze the influencing factors of attention. For example, the mechanism of action of factors such as GDP, aviation industry output value, policy investment, and tourism income of each city on attention has not been clarified, making it difficult to explain the causes of spatiotemporal differentiation of attention from the root.

3) The research scale needs to be expanded: This study mainly carries out analysis from three scales: provincial, municipal, and regional, and does not go deep into the district and county scale. However, the industrial layout and public attention of the low-altitude economy in Shaanxi Province may have more significant differentiation characteristics at the district and county scale. For example, the attention characteristics of core districts and counties such as Yanliang Aviation Base in Xian and Airport New City in Xianyang have not been accurately depicted, and the refinement of the research results is insufficient.

4.3. Research Prospects

In view of the limitations of this study, combined with the development trend of the low-altitude economy industry and the cutting-edge direction of academic research[24, 25], the future research prospects are put forward, aiming to further improve the research system of online attention to the low-altitude economy in Shaanxi Province and provide more accurate theoretical support for high-quality industrial development.

First of all, future research can integrate multi-source data such as Baidu Index, social media interaction data, news report data, and offline experience data, use methods such as entropy weight method and analytic hierarchy process (AHP) to construct a comprehensive evaluation index system of online attention to the low-altitude economy, and combine questionnaire surveys, in-depth interviews and other methods to analyze the differences in low-altitude economy cognition among different groups, so as to comprehensively and accurately depict the public cognition characteristics of the low-altitude economy in Shaanxi Province.

Secondly, follow-up research can select indicators such as the economic development level, industrial foundation, policy investment, tourism resources, and population size of each city, use quantitative methods such as multi-scale geographically weighted regression (MGWR) and panel data model to construct an influencing factor model of online attention to the low-altitude economy, clarify the spatiotemporal heterogeneous mechanism of action of each factor on attention, and find out the key path to improve public attention to the low-altitude economy in Shaanxi Province from the root[26].

Finally, place the research on online attention to the low-altitude economy in Shaanxi Province in a national perspective, select typical provinces in the east, central and western regions (such as Guangdong, Hubei, Sichuan) to carry out inter-provincial comparative research, analyze the differences in spatiotemporal characteristics of online attention to the low-altitude economy in different regions, and explore the impact of factors such as regional economic development level, industrial foundation, and policy environment on public cognition of the low-altitude economy[27], so as to provide a reference for Shaanxi Province to learn from the advanced experience of other provinces and create a low-altitude economy development model with northwest characteristics.

In addition, as the low-altitude economy has become an important field for cultivating new quality productive forces,

future research can also explore the coupling and coordination relationship between online attention to the low-altitude economy and high-quality industrial development in combination with the development requirements of new quality productive forces, analyze the promoting role of public cognition in industrial innovation, industrial integration, and industrial upgrading, and provide theoretical and practical support for the low-altitude economy in Shaanxi Province to achieve a virtuous cycle of "improved public cognition - expanded industrial demand - high-quality development".

5. Conclusion

Based on Baidu Index data, this study uses methods such as time series fitting, autocorrelation coefficient, coefficient of variation, and Global Morans I to analyze the temporal evolution characteristics and spatial distribution pattern of online attention to the low-altitude economy in Shaanxi Province from 2020 to 2025, and clarifies the temporal change law and spatial differentiation characteristics of public cognition of the low-altitude economy in Shaanxi Province. The research findings are as follows:

1) The temporal evolution shows a phased continuous decline with short-term periodic fluctuations: From 2020 to 2025, the online attention to the low-altitude economy in Shaanxi Province generally presents a three-stage characteristic of "slow decline - accelerated decline - continuous significant decline". The absolute values of the fitting slopes of each stage increase in turn and are all statistically significant, reflecting that public attention gradually decreases over time, and the cultivation of industrial public cognition fails to meet expectations. At the same time, the attention has a short-term periodic fluctuation of about 90 days, and the annual periodic characteristic is not significant, indicating that public attention is mainly driven by quarterly short-term events such as policy release and industrial project implementation. The low-altitude economy has not yet formed stable annual attention hotspots, and the long-term public attractiveness of the industry is insufficient.

2) The spatial distribution presents a pattern of core leadership and regional differentiation, with a medium level of municipal differences: The spatial distribution of online attention to the low-altitude economy in Shaanxi Province presents the characteristics of "Guanzhong region as the leading role, Northern and Southern Shaanxi balanced and complementary". The total attention of the Guanzhong region accounts for 65.08% of the province, forming a "1 core and 4 supplements" structure with Xian as the only high -attention city. The total attention proportion of Northern Shaanxi and Southern Shaanxi is about 17% each, both of which are single-core structures composed of medium-attention cities. At the municipal scale, only Xian is a high -attention city, and the other 9 cities are medium-attention cities, with no low-attention cities. The coefficient of variation among cities is 81.30%, which belongs to the medium difference level, indicating that the public attention to the low-altitude economy in Shaanxi Province has a certain balance at the municipal scale, with no serious polarization, but the attention gap between core cities and other cities is still significant.

3) There is no significant spatial correlation at the provincial scale, and the regional radiation and driving effect is weak: The Global Morans I analysis shows that the I value of online attention to the low-altitude economy in 10 prefecture-level cities of Shaanxi Province is -0.203, with no significant spatial correlation at the 95% confidence level, indicating that the public attention of each city has not formed an obvious spatial agglomeration effect. The attention characteristics of each city are mainly affected by local factors such as local economic development level, aviation industrial foundation, and policy implementation intensity. The radiation and driving effect of Xian as a core city has not been effectively exerted, and the coordination and linkage between the low-altitude economy industry and public cognition between Northern Shaanxi, Southern Shaanxi and Guanzhong regions, as well as between various cities, are insufficient.

On the whole, the spatiotemporal characteristics of online attention to the low-altitude economy in Shaanxi Province are highly related to the provinces industrial development foundation and policy promotion rhythm, and also highlight practical problems such as insufficient cultivation of industrial public cognition, weak regional coordination, and insufficient highlighting of core radiation role. In the future, to develop the low-altitude economy in Shaanxi Province, it is necessary to implement phased publicity and guidance strategies combined with the short-term cycle law of attention and create local characteristic industrial IP. At the same time, formulate differentiated development strategies based on spatial differentiation characteristics, strengthen the core leading role of Xian, promote the coordinated deve lopment of regional industry and public cognition, consolidate the public foundation for industrial development, and give full play to the leading role of the low-altitude economy in cultivating new quality productive forces and promoting regional economic transformation and upgrading.

Acknowledgments

This work is supported by Research Project of Xi'an International Studies University Students Innovation and Entrepreneurship Training Program Project, Project Number:202510724054.

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