Research on Olympic Games Hosting Plans Based on TOPSIS and Forecasting Models

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Abstract. In recent years, fewer and fewer countries are willing to participate in the Summer and Winter Olympics due to the enormous costs, fundraising difficulties, difficulty in recovering investments, and wastage of facilities after the events. To propose feasible Olympic Games hosting plans, this study divided the Games into four seasons and selected 17 indicators for each project category. The GRA-TOPSIS comprehensive weighted evaluation model was adopted to assess the applications of various countries to host the Olympics. In addition, the top three countries in each season were selected as semi-permanent venues. Finally, using the top three countries in each season as examples, grey forecasting models and background trend line models were constructed to predict the economic and tourism benefits of hosting the Olympics. Through these measures, this study proves that hosting small-scale Olympics will bring considerable benefits to countries and provide assistance to actively stimulate countries' willingness to apply for hosting the Olympics. The results of this study have important reference value for the planning of Olympic Games.

Keywords: GRA-TOPSIS; Grey Forecast; Background Trend Line; Fuzzy Integrated Evaluation; Mini Olympics.

1. Introduction

In recent years, fewer countries have been willing to bid for both the Summer and Winter Olympics. Over the past 20 years, the number of countries bidding to host the Olympic Games has dropped from a peak of 11 countries to only two countries currently willing to bid for the 2024 Winter Games (Figure 1). Olympic Games organizers face a number of serious difficulties, including high costs, difficulties in fundraising, challenges in return on investment, and wasteful idling of post-event facilities[1]. In addition, the uncertainty of various disasters can lead to a reduction in visitor, journalist, and ticket revenues for the host city and increase organizational costs, thus reducing enthusiasm for bidding. At the same time, people live in a world with limits on carbon emissions, and the possibility of overtourism leads to more opposition to hosting the Olympics in their own cities[2]. However, hosting the Olympics and passing on the Olympic spirit is important to promote world peace and development. Therefore, there is a need to develop a working plan to cope with the decreasing number of countries bidding to host the Summer and Winter Olympics and to ensure the success of the Games. Changes in the number of countries hosting the Olympic Games are shown in figure 1.

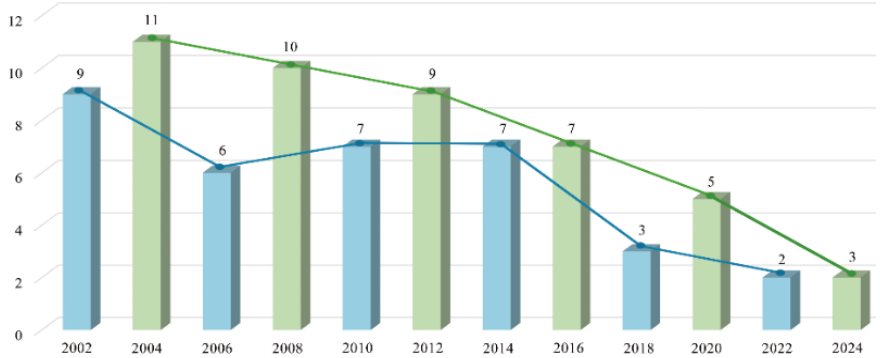


Figure 1: Changes in the number of countries hosting the Olympic Games (2002-2024)

There is a growing number of scholars who have studied the impact of hosting the Olympic Games, the innovation of the hosting model, and the difficulties faced. Some scholars have found significant

differences in the long-term economic development of different countries by hosting the Olympic Games through a comparative analysis of economic data from the host countries of the last five Olympic Games, and have proposed that appropriate government intervention would promote positive effects on the economies of these regions[3]. At the same time, hosting the Olympic Games, i.e., being affected by the environment, also affects the environment, and the IOC can transform its identity into a global partner for sustainable development with environmental responsibilities to promote sustainable development of the Olympic Games[4]. In addition, the reasons for the coldness of Olympic bids today are analyzed through methods such as the literature method, and measures such as good cost budgeting, scientific assessment of benefits and reduction of risks in running the games are proposed accordingly[5]. Some scholars analyzed the reasons for the coldness of Olympic bids by methods such as deductive reasoning and proposed the model of holding Olympic projects in a combination of multiple geographic regions[6]. By comparing the differences between the Olympic Games and the World Cup in the bidding process, some scholars analyzed the current dilemma faced by the Olympic Games, and proposed changing the single-city hosting and controlling the scale of the event to reduce the related hosting pressure[7].

Previous authors have studied the problems faced by Olympic bids today and the impact of hosting the Olympic Games, and in order to solve the problem of cold bids for the Olympic Games, this paper proposes dividing the Olympic Games into four seasons of mini-Olympics, using the GRA-TOPSIS evaluation model to assess the conditions for national Olympic bids, and then using the gray prediction model and the background trend line model to predict the economic, tourism The GRA-TOPSIS evaluation model was used to assess the conditions for a country to bid for the Olympic Games. Finally, a fuzzy integrated evaluation method was used to analyze the overall benefits and confirm the rationality of the proposal.

2. GRA-TOPSISI Evaluation Model Based on Combination Weighting

This paper breaks down the Olympics into several smaller Olympic programs, providing more flexibility for the hosts, softening the previous rigid requirements on the hosts, and reducing the pressure on the host cities. At the same time, a large number of previous studies have shown that the hosting of the Olympic Games brings economic development to the host country, the improvement of public services, the increase of pride and pride of the residents of the host city, and the increase in the visibility and influence of the country and the city[8][9]. As a result, the implementation of the program may not only open the door for smaller cities and countries to host the Games, but also may facilitate the decision of countries to bid for the Games, driven by reduced pressure to host and possible future benefits.

This paper first divides the previous Olympic Games into ground events, aquatic events, ice and snow events according to the venue and season, and introduces e-sports events in combination with today's hot spots, which will be held in different seasons. After that, a model was established to evaluate the ability of each country to host the Olympic Games, and the countries with higher rankings were selected, firstly, for subsequent benefit prediction to prove the rationality of the selected plan; The second is to be used as a semi-fixed place to hold the Olympic Games to ensure the normal development of the Olympic Games.

For the selection of semi-fixed venues for the Olympic Games, this paper use the combination-empowered GRA-TOPSIS evaluation model to evaluate the bidding conditions of countries or regions, and based on the proposed plan, rank the countries suitable for hosting the Olympic Games in four seasons, and obtain the countries that are more capable of becoming semi-fixed venues for the Olympic Games.

2.1. Model Preparation

Referring to the historical data of large-scale events such as the Olympic Games and the World Cup, this paper preliminarily screened out 20 countries with certain capabilities and conditions to

host the Olympic Games as the objects of follow-up modeling evaluation and prediction based on economic strength, political stability, social stability, sports development, experience in hosting large-scale games, and facilities for hosting the Olympic Games:

Australia, Brazil, Belgium, Germany, France, Finland, South Korea, Netherlands, Canada, United States, Mexico, Japan, Sweden, Spain, Greece, Italy, United Kingdom, China, Qatar and Switzerland.

In order to assess the ability of the above 20 countries to become semi-fixed venues for the Olympic Games, this paper creates a capacity assessment system for bidding to host the Olympic Games, selecting 6 primary indicators and 17 secondary indicators for analysis. The selected indicators are shown in Table 1.

Table 1. Selection and grading of indicators

Level 1 Indicators	Level 2 Indicators
land utilization	Land Development Degree
social stability	Rate of Unemployment
	Incidence of Population Malnutrition
	Proportion of Urban Population
	Power Consumption
	Population Quantities
economic technique	GDP
	Total Reserves (including gold)
	R&D Expenditure (% of GDP)
	Number of Resident Patent Applications
levels of physical training	Number of Olympic medals
tourism development	Number of Foreign Tourist Arrivals
	Rail Lines(total route-km)
	Number of Material Cultural Heritage
	Number of Airports
Special Objective	Streamflow
	Minimum Temperature(winter)
	E-Sports Industry Scale

2.2. Data Description

This paper selected data on a country-by-country basis, such as land use rasters, world administrative divisions, GDP, population, employment rate, total number of gold, silver, and bronze medals in previous Olympic Games, number of sports venues, number of tangible cultural heritage, average winter temperature, total river flow, scale of e-sports industry, number of airports, number of foreign tourist arrivals, urban population, incidence of malnutrition, number of resident patent applications, etc., which are derived from the World Bank, International Statistical Yearbook, Google Earth, European Space Agency and the Copernicus Climate Change Service, among others.

Among them, the location of the above 20 countries and the status of land use in 2020 are shown in Figure 2, and this paper have conducted spatial analysis of land use data, Using ArcGIS software to conduct zoning statistics, the construction land area of each country is obtained, and then refer to existing research[7] quantify the degree of land development in each country.

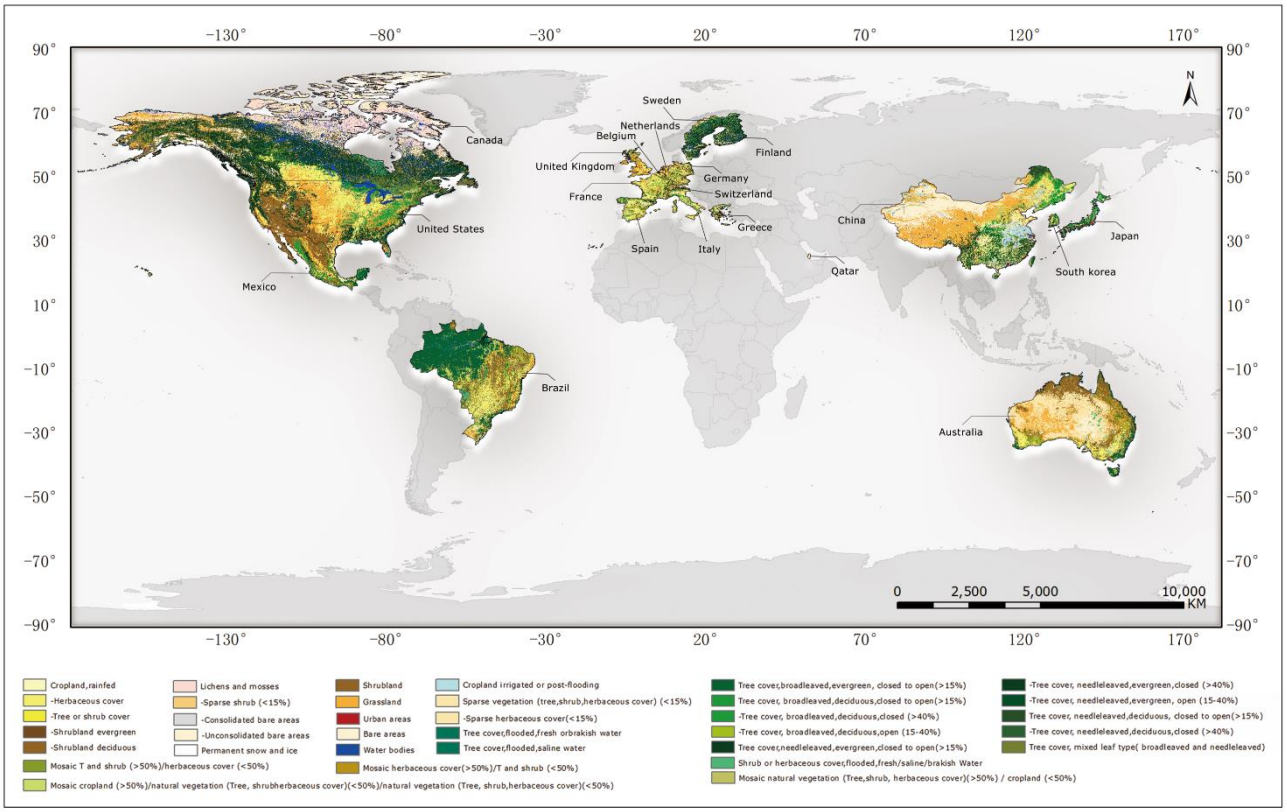


Figure 2. Land use status of 20 countries (2020)

2.3. GRA-TOPSISI Evaluation Model Based on Combination Weighting

Based on the selected indicators, this paper used an evaluation model to calculate the level of capacity of the region to host the Olympics. Evaluation models are widely used in finance, tourism and other industries. The traditional evaluation models include TOPSIS, gray correlation (GRA) evaluation model, etc. Evaluation models handle the relationships between data well, so as to rate objects more accurately. However, it still has the disadvantage of not being able to determine the trend of the program. The GRA evaluation model scores objects by considering the degree of similarity between objects, but cannot measure the relationship between objects and the optimal value. Moreover, most evaluation models generally use expert analysis for the weight selection of features, which is too subjective. Based on this, this paper proposes a GRA-TOPSIS evaluation model based on combinatorial empowerment.

The main process of the GRA-TOPSIS evaluation model based on combinatorial empowerment is to select data indicators, subjective weighting by DEMEL method, objective weighting by information entropy method, and final feature weights to be obtained by combination.

The final weight is obtained by combining the subjective weight and the objective weight through the combination coefficient. This paper adopts the following combination methods:

$$W = 0.6w^1 + 0.4w^2 \quad (1)$$

The results of the weighting of each index are shown in Figure 3.

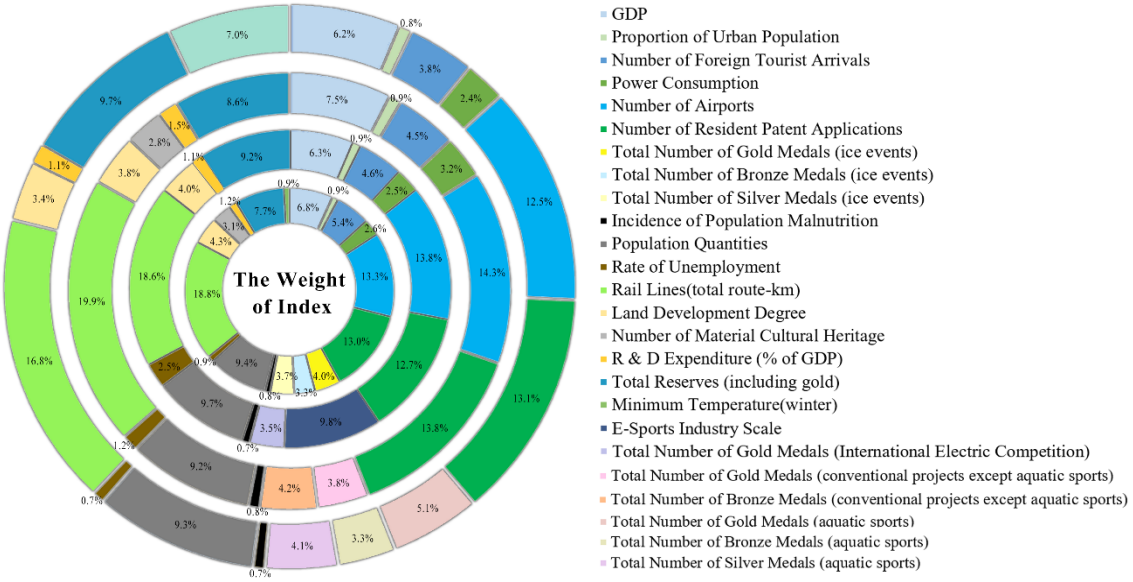


Figure 3. The weight of index

Finally, the evaluation method combining TOPSIS and GRA was used to score the regional hosting of the Olympic Games in each region.

Because GRA only considers the similarity between graphic shapes, it cannot measure the distance between the object and the ideal solution, and TOPSIS only expresses the lack of distance, so it cannot determine the development trend of the scheme. Therefore, the two methods are organically combined to optimize the selection formula of the positive and negative ideal schemes of the object. Using the grey correlation degree between the selected object and the positive and negative ideal solutions to construct the relative closeness degree to select the scheme, thus improving the effectiveness and scientificity of the selection, making the relative closeness degree of the selection result more accurate, thus helping the decision maker to make a more accurate choice. Specific calculation steps are as follows:

(1) Data Normalization

After collecting the data, this paper process 17 indicators and normalize the data through forward processing.

(2) Calculate the i-th object and the j-th index with the positive ideal solution z_j^+ and negative ideal solution z_j^+, grey correlation factor ξ_{ij}^+, ξ_{ij}^-.

$$\xi_{ij}^+ = \frac{1}{z}\sum_{j=1}^{m} \frac{\min_i \min_j \left|z_{ij}-z_j^+\right| + \rho \max_i \max_j \left|z_{ij}-z_j^+\right|}{\left|z_{ij}-z_j^+\right| + \rho \max_i \max_j \left|z_{ij}-z_j^+\right|}$$
$$z_j^+ = \max\left(z_{1j}, z_{2j}, \cdots z_{nj}\right) \tag{2}$$
$$\xi_{ij}^- = \frac{1}{z}\sum_{j=1}^{m} \frac{\min_i \min_j \left|z_{ij}-z_j^-\right| + \rho \max_i \max_j \left|z_{ij}-z_j^-\right|}{\left|z_{ij}-z_j^-\right| + \rho \max_i \max_j \left|z_{ij}-z_j^-\right|}$$
$$z_j^+ = max(z_{1j}, z_{2j}, \cdots z_{nj})$$

Where rho is the resolution coefficient, based on experiencer rho=0.5.

(3) Calculate the homogeneous ideal solution for each object z_j^+ and negative ideal solutions z_j^+, degree of grey correlation γ_i^-, γ_i^+.

$$z_j^+ = max(z_{1j}, z_{2j}, \cdots z_{nj}) \tag{3}$$

$$\gamma_i^{\pm} = \sum_{j=1}^{m} W_j \, \xi_{ij}^{\pm} \tag{4}$$

(4) Calculate the Euclidean distance of each object from positive and negative ideal solutions d_i^+, d_i^-

$$d_i^{\pm} = \sqrt{\sum_{j=1}^{m}(z_{ij} - z_j^{\pm})^2} \tag{5}$$

(5) Normalize the Euclidean distance and grey correlation degree of positive and negative ideal solutions of each object:

$$R_i^{\pm} = \frac{\gamma_i^{\pm}}{max(\gamma_i^{\pm},\cdots\gamma_n^{\pm})} \tag{6}$$

$$D_i^{\pm} = \frac{d_i^{\pm}}{max(d_i^{\pm},\cdots d_n^{\pm})} \tag{7}$$

(6) Calculate the score for each object:

$$S_i = \frac{aR_i^{+}+bD_i^{-}}{(aR_i^{+}+bD_i^{-})+(aR_i^{-}+bD_i^{+})} \tag{8}$$

The model results are presented in Figure 4:

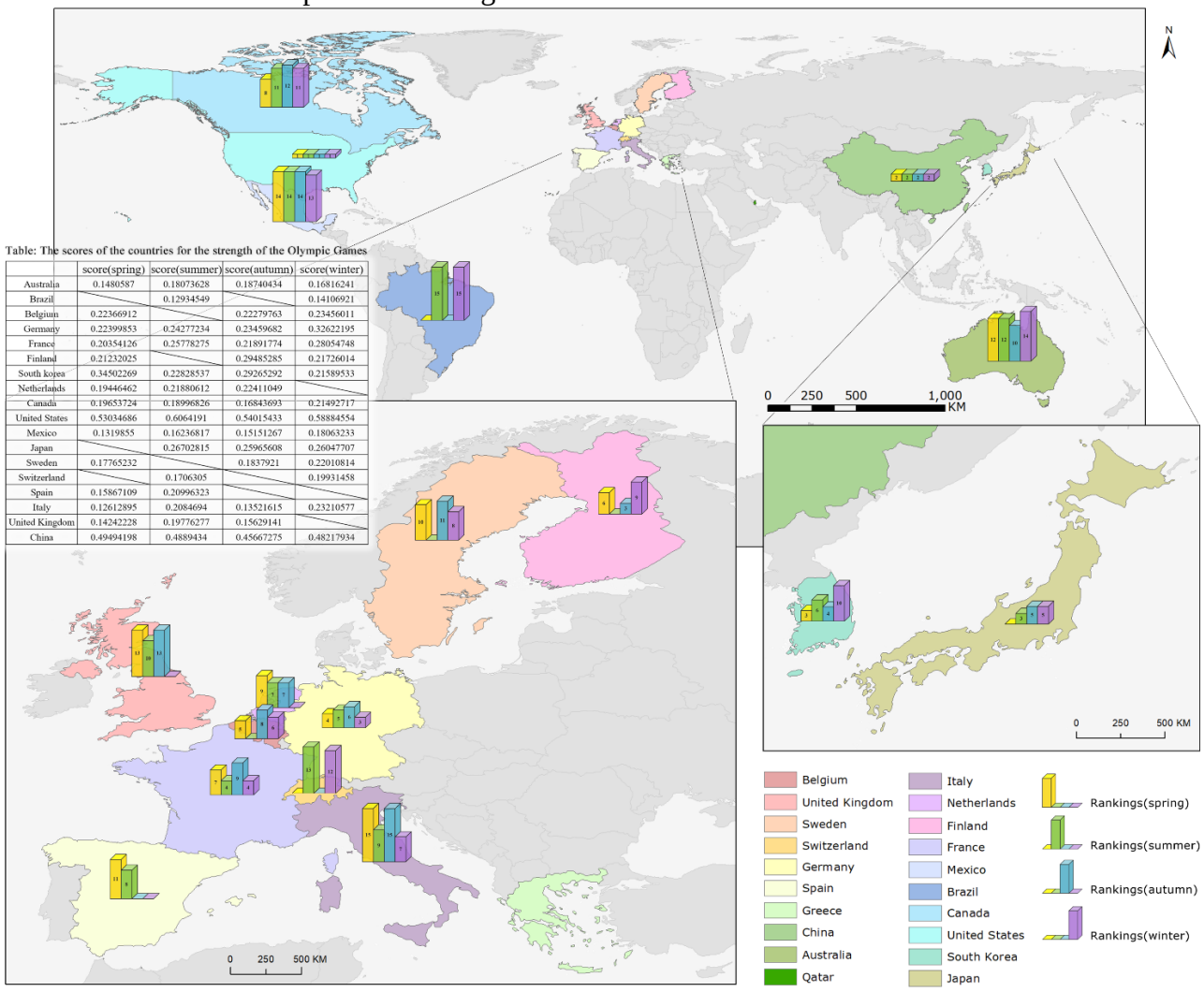


Figure 4. Scores and rankings of countries

It can be seen from the figure that under the comprehensive evaluation of economic conditions and infrastructure in the four seasons, China and the United States are more suitable than other countries to host the Olympic Games. Secondly, in spring or autumn, countries such as Germany, Finland and South Korea are more suitable for hosting Olympic Games with the theme of fun sports or water sports, in winter, Germany, France and other countries are more suitable for holding Olympic Games with the theme of ice and snow sports, and in summer, Japan, France and other countries are more suitable for holding the Olympic Games dominated by ground events.

3. Projection and evaluation of the benefits of hosting the Olympic Games

3.1. Background Trendline Model:

In terms of cross-sectional impact, the impact of the Olympics on tourism was selected for analysis and resolution.

In this paper, the impact of the Olympics on tourism is defined as the ratio of tourism indicators for hosting the Olympics to the corresponding tourism indicators for not hosting the Olympics, leading to an impact model. The tourism indicators without hosting the Expo are unknown, therefore, they need to be predicted and are considered to be predicted using a background trend line model. In this paper, the values predicted using the background trend line model are set as background values.

"Tourism background trend line theory was proposed by Sun Genian in 1998, the background trend line is the natural trend line of tourism development without the impact of internal and external contingencies is the basic trend of tourism development after the elimination of the impact or influence of contingencies (crises and celebrations), which is the inevitable result of the interaction between the tourist area and the source segment "[10], the background line theory of tourism in a region should have its own definite laws, which can be simulated by the combination of "trend term + period term".

The tourism background trend line has two functions:

①To analyze and assess the impact of unexpected events (crisis or celebration) on tourism development.

②Forecasting the future trends of the tourism industry.

The "trend term + period term" can generally be expressed in several basic models as follows:

(1) Linear-logistic growth composite model:

$$Y = at + b + \frac{K}{1+e^{c-rt}} \tag{9}$$

(2) Linear-trigonometric composite model:

$$Y = at + b + qsin(\omega t + \emptyset) \tag{10}$$

(3) Exponential-trigonometric composite model:

$$Y = ce^{rt} + qsin(\omega t + \emptyset) \tag{11}$$

The above equations are the objects for which background values are required, while the independent variable is time and the rest are parameters.

Principles for selecting the best integrated model: For different forecast objects, nonlinear fits are performed with previous data, and then the respective optimal models are selected (to find the strongest significance). The respective background trend lines are established to derive the intrinsic trend equations without shocks and disturbances from major domestic or foreign events.

Excluding the effect of the Olympics, the background trend line projections for total reserves (including gold), international tourism arrivals, unemployment rate, and GDP are selected for the Beijing Olympics in 2008, London Olympics in 2012, and Rio Olympics in 2016, respectively, based on data for the years 2001-2020.

The paper applied the 1st0pt software to fit the raw data on the number of tourists and their corresponding years nonlinearly to select the respective optimal background trend line model.

The higher the correlation coefficient, the better the prediction of the trend equation. Through comparative analysis, this paper selects the linear-triangular growth integrated model. Then, the background trend line equation is

$$\mathrm{Y} = 287.9\mathrm{t} - 567858.8 - 262.1\sin(1.15\mathrm{t} - 1454.8) \tag{12}$$

Apply the background trend line equation to solve the background value prediction.

Projections from the three regions in the year of hosting the Olympic Games and four years after the data, compared with the actual statistical values, the results are shown in Table 2:

Table 2. Fitting equations for each model and correlation coefficients

China (Beijing)		United Kingdom (London)		Brazil (Rio)	
Background value	Statistical value	Background value	Statistical value	Background value	Statistical value
128270121.9	130027000	32446143.1	32221000	6435960.199	6547000
125240948.8	126476000	32342520.35	33567000	6543667.395	6589000
122694126.6	133762000	31833246.88	35337000	6653324.488	6621000
120552848.1	135423000	31137246.35	36792000	6762810.723	6353000
118752536.5	132405000	30418617.06	39129000	6872311.929	3335000

In addition, this paper selected the three indicators of GDP, unemployment rate, and total reserves (including gold) for analysis and built a gray prediction model with historical data to predict these indicators for these three locations assuming no Olympic Games were held.

3.2. Gray prediction model

The steps for building the gray prediction model are as follows:

(1) Computationally generated sequences$X^{(1)}$, when modeling with GM(1,1), This paper first accumulate the original data once to obtain the sequence $X^{(1)}$,

$$\mathrm{x}^{(1)}(\mathrm{i}) = \sum_{\mathrm{m}=1}^{\mathrm{i}} \mathrm{x}^{(0)}(\mathrm{m}) \quad (\mathrm{i} = 1,2 \ldots \mathrm{n}) \tag{13}$$

The corresponding incremental series can be obtained

$$X^{(1)} = (x^{(1)}(1), x^{(1)}(2), \ldots x^{(1)}(n)) \tag{14}$$

(2) The whitening equation of the model is obtained, and $Z_j^{(1)}$is first generated by computing the immediate mean for $X^{(1)}$:

$$z_j^{(1)}(m) = \frac{1}{2}[x^{(1)}(m) + x^{(1)}(m-1)] \quad (m = 2, \ldots, n) \tag{15}$$

This paper then write the gray function based on the GM(1,1) modeling:

$$x^0(k) + az^{(1)}(k) = b \tag{16}$$

The parameter matrix is then estimated according to the least squares parameter estimation method to model the approximate differential equations using the discrete data series to obtain the whitening equation for GM(1,1):

$$\frac{dx^{(1)}(t)}{dt} + ax^{(1)}(t) = b \tag{17}$$

(3) The solution of the whitening equation, which yields the predicted value $\widehat{\mathrm{X}}^{(0)}$ expression, is the solution of the white equation as a time response function

$$x^{(1)}(k) = (x^{(0)}(1) - \frac{b}{a})e^{-a(t-1)} + \frac{b}{a} \tag{18}$$

By changing the values in this paper can derive the predicted values of the original data series $X^{(0)}$, as:

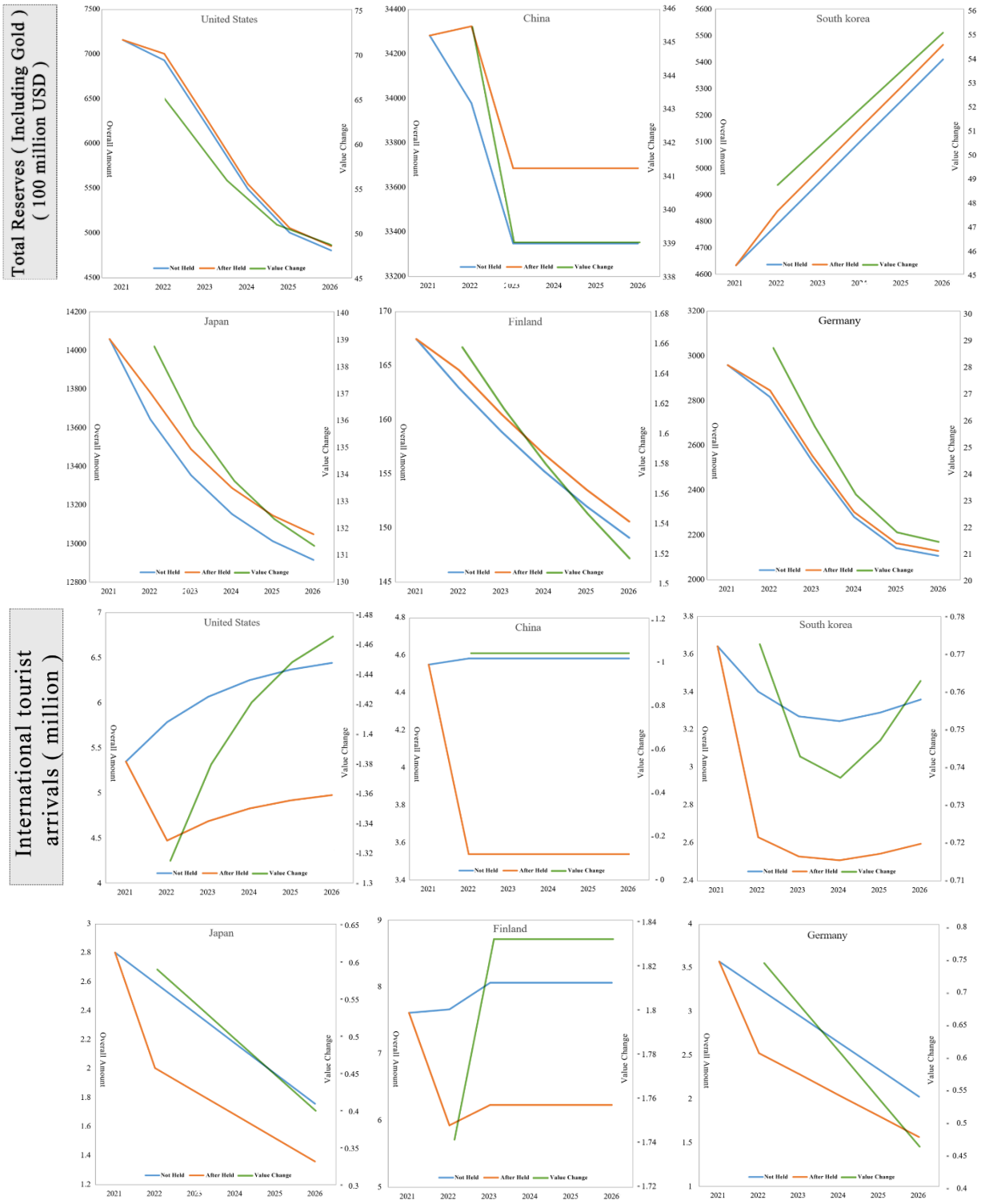
$$\hat{x}^{(0)}(k+1) = \hat{x}^{(1)}(k+1) - \hat{x}^{(1)}(k) \quad (k = 1,2, \ldots, n-1) \tag{19}$$

Assuming that no Olympic Games are held, the predicted values of the obtained indicators are calculated and then compared with the actual statistical values to measure the degree of average deviation, with correction factors for each indicator as shown in Table 3.

Table 3. Correction factor of the indicator

Indicators	Correction factor
GDP	0.110183
Unemployment rate	-0.22721
Travel	0.100989
Total reserves	0.010168

The indicators for those countries that are assumed not to host the Olympic Games in the future are then projected through a gray prediction model, and the results of the comparison between the assumed future hosting of the Olympic Games and not hosting the Olympic Games are shown in Figure 5.



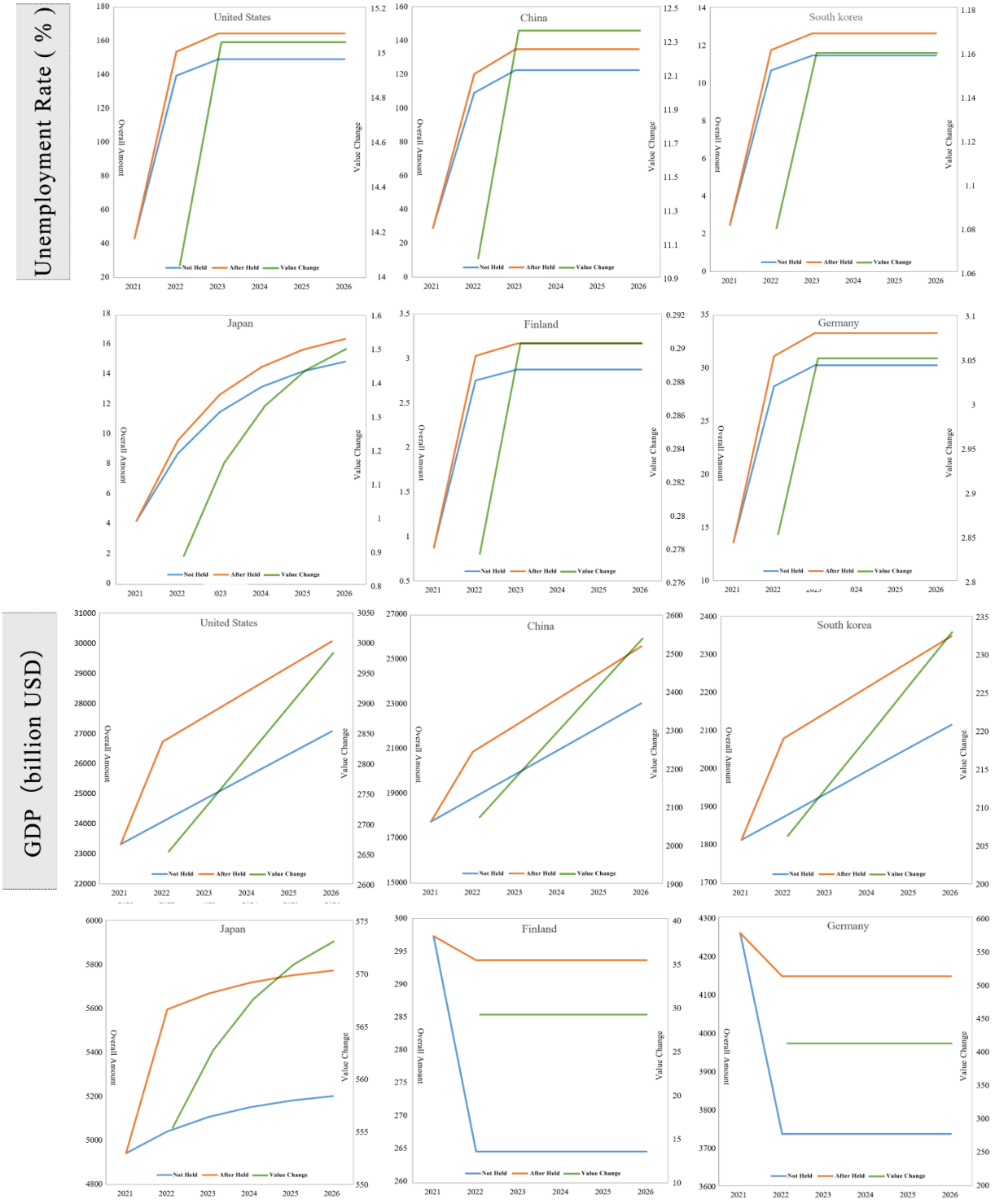


Figure 5. The comparison results of holding the Olympic Games or not

The four indexes of relative error, slope correlation, mean square error ratio, and probability of small error were tested, and the test accuracy results were obtained as shown in Table 4.

Table 4. Gray prediction test accuracy table

Relative Error ε	0.0203	Level 2(Qualified)
Relevance γ	0.9565	Level 1(Good)
Mean Squared Error Ratio C	0.1503	Level 1(Good)
Small error probability P	1	Level 1(Good)

All four of its test criteria are above Level 2, indicating a good test.

3.3. Fuzzy integrated evaluation model

This paper establishes a fuzzy comprehensive evaluation model before the prediction of the impression of the Olympic Games to make a quantitative comprehensive evaluation. The prerequisite for using this model is to divide a certain number of levels for each influence index.

Determination of cut-off standard values.

Establishing a set of evaluation factors.

③Establishing evaluation level sets.

④Build evaluation matrix R.

There are four factors m involved in the evaluation of this question, and there are five levels of evaluation criteria n for each indicator of the Olympic Games. Each factor in u is fuzzy judged according to the judging rules. r_{ij} denotes the possibility of the *j* rank of the first kind of judging index, r_{ij} is the affiliation of i to j, so the judging matrix can be obtained as follows:

$$R = \begin{bmatrix} r_{11} & r_{12} & \cdots & r_{1n} \\ r_{21} & r_{22} & \cdots & r_{2n} \\ \cdots & \cdots & \cdots & \cdots \\ r_{m1} & r_{m2} & \cdots & r_{mn} \end{bmatrix} \tag{20}$$

Because of the affiliation of r_{ij} i to j, this paper draw on the water quality level judgment "surface water environmental quality standard" to calculate the affiliation formula for each type of water quality. The affiliation formula in this question is obtained as follows:

$$\begin{cases} r_{ij} = \begin{cases} 1 & c_i \geq s_j \\ \frac{c_i - s_{j+1}}{s_j - s_{j+1}} & s_j > c_i > s_{j+1} \\ 0 & c_i \leq s_{j+1} \end{cases} \\ r_{i(j-1)} = 1 - \frac{c_i - s_{j+1}}{s_j - s_{j+1}} \end{cases} \tag{21}$$

Where for each Olympic Games, c_i is the value of the i judging criterion and s_j is the boundary value of the classification criterion for the j category. Thus for each Olympic Games, this paper can derive a judgment matrix R_i.

⑤Determine the weight vector W.

Of course, in essence, each criterion will not play the same role in the overall evaluation of the Olympic Games, for example, the number of international tourism arrivals plays a significant role in judging the success of the Olympic Games. Therefore, the paper need to set a weighting factor for each factor.

This paper can use the method of evaluating the contribution rate of factors to determine the weight vector. It defined that $\overline{I}_i = \frac{\bar{s}_i}{\bar{c}_i}$ $\bar{s}_i$ is the average of each categorical value of the first rubric. Therefore, the formula for calculating the weight of each indicator is as follows:

$$w_i = \frac{I_i}{\sum_{i=1}^{m} I_i} \tag{22}$$

Thus, the weight matrix for each scoring criterion was derived:

$$W = [w_1, w_2, \ldots, w_m] \tag{23}$$

⑥Derive the weighted evaluation matrix:

$$T = W * R = [t_1, t_2, \ldots, t_n] \tag{24}$$

In summary, the paper have developed the following fuzzy integrated evaluation model:

To obtain the combined impact coefficient, this paper the matrix $B = [1,2,...,n]$, The resulting composite impact factor.

$$a = T * B'(\text{where } B' \text{ is the transpose matrix of } B) \quad (25)$$

In this paper, MATLAB is used to find out the composite evaluation value of the countries of the United States, China, Korea, Japan, Finland and Germany in the future with and without the Olympic Games, and to rank and compare them, and the larger the final composite evaluation value obtained, the greater the positive impact of the Olympic Games. The results are shown in Table 5.

Table 5. Assuming the overall evaluation value of the future Olympic Games for the host country and the ranking

	USA		CHN		KOR	
Year	Not held	After held	Not held	After held	Not held	After held
2022	0.563784	0.613571	0.441807862	0.480783546	0.043331	0.04715
2023	0.603472	0.657044	0.495532521	0.539619302	0.046512	0.050634
2024	0.603696	0.657068	0.495850164	0.539653103	0.04653	0.050636
2025	0.60392	0.657092	0.496167807	0.539687384	0.046549	0.050639
2026	0.604145	0.657116	0.49648545	0.539722239	0.046567	0.050641

	GER		FIN		JPN	
Year	Not held	After held	Not held	After held	Not held	After held
2022	0.114099	0.124512	0.011078347	0.012118561	0.03652	0.038709
2023	0.122009	0.133221	0.011576991	0.012667563	0.047602	0.05089
2024	0.122009	0.13322	0.011576984	0.012667556	0.054404	0.058366
2025	0.122008	0.13322	0.011576977	0.012667549	0.058579	0.062954
2026	0.122008	0.13322	0.011576971	0.012667543	0.061143	0.06577

Analysis of the table shows that if a region or a country hosts the Olympics in the next five years, it is likely to have a positive impact on that region and country.

4. Conclusions

Based on the basic bidding conditions, the paper selected 20 countries including the United States, China and Japan for analysis. After that, 17 indicators such as GDP and international tourism arrivals were selected to evaluate the ability of these countries to host the Olympic Games by season through the TOPSIS model whose indicators was assigned weights by the Entropy Weighting Method and DEMATEL scientifically. The results show that China and the United States rank in the top two in four seasons. South Korea, Japan, Finland and Ger-many ranked third respectively, indicating that these countries have strong comprehensive strength and are more suitable for hosting the Olympic Games. These countries will be identified as semi-regular venues for the Olympic Games.

Then, by comparing the changes of each index before and after the Olympic Games, it is proved that holding a small Olympic Games will bring considerable benefits to the country, which will have a positive incentive for the willingness of countries to apply for the Olympic Games. First of all, GDP, total reserves (including gold) and other indicators use the Grey Forecast Model, and the number of international inbound tourists uses the Background Trend Line Model to predict the existing year data based on historical data. Comparing the predicted value with the actual value, the correction coefficient of each index is calculated. Secondly, the top countries are selected, and the Grey Prediction Model is used to predict these indicators again. The changes of the indicators after the Olympic Games are measured and corrected by the correction coefficient. Finally, the Fuzzy Integrated Evaluation Method is used to analyze the predicted results, and the com-prehensive income of each index before and after the Olympic Games is compared. Proving that hosting a mini-Olympics will bring considerable benefits to the country, it positively stimulates the willingness of countries to bid for the Games.

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