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Research on the Development of Tourism Industry in the Post-Epidemic Period——Analysis Based on Multiple Regression Model GM(2,1) Model

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Abstract: *The outbreak of the new crown epidemic has had a serious impact on the development of the tourism industry. Although the development of the tourism industry has recovered in the post-epidemic period, some people still have concerns about the development prospects of the tourism industry. This paper uses the multiple regression model and the GM (2,1) model for analysis. The basic indicators of the tourism industry include: tourism foreign exchange income, domestic tourism number, domestic tourism revenue, domestic travel agency number, domestic tourism agency employment, domestic tourism industry. The number of colleges and universities and the number of foreign inbound tourists. Quantitative analysis of tourism "fundamentals" by means of descriptive statistics. Then, the mathematical models of the "fundamentals" of the tourism industry are respectively constructed, and then the GM(2,1) model is used to predict the development of the "fundamentals" in the next three years , and relevant conclusions and suggestions are put forward.*

Keywords: *post-epidemic period; tourism industry; multiple regression model; GM (2.1) model*

1. Introduction

In 2020, China's tourism industry has encountered an unprecedented "overall freeze". In various media, countless depressing information can always be received: because of the epidemic, homestays have become the first "returnees". Zero" industry; the cruise ship "Diamond Princess" has almost become a ship that cannot be docked; the stocks of several major airlines have fallen, and Hainan Airlines[1], which has beautiful flight attendant clothes, is rumored to be split; all attractions are closed. It seems that the good life of "poetry and the distance" is far away from us in January. "Survive" has become the first goal of practitioners in the tourism industry, and there are always people who are unwilling to fail like this. Therefore, in the confusion, hesitation and sigh, we also heard different voices: some scenic spots began to turn offline tourism into online "cloud tours"; some homestays changed their business models and began to try long-term rentals; online Tourism agencies - such as Fliggy - have launched a series of "hemostasis" measures despite their losses, and they are trying to "create blood" for everyone. When a crisis hits, critics often lament, "In an avalanche, no snowflake is innocent." But doers believe, "All people can survive as long as the industry survives."

The impact of the epidemic on the tourism industry is global, and the period also extends from the Spring Festival to July. Although some scenic spots and hotels in the past May Day holiday and Dragon Boat Festival had a certain degree of "outbreak" of orders, the impact of the epidemic on the tourism industry should be normal and long-term[2]. Such a long cycle and scope of influence will definitely affect users. Consumer behavior and habits.

Tourism practitioners have two diametrically opposed attitudes towards the recovery of the tourism industry after the epidemic[3]. One is more optimistic, looking forward to the rapid release of demand after the epidemic is lifted, and even a "retaliatory rebound" like SARS in 2003. The other is more pessimistic, believing that in the context of the global economic downturn, and coincidentally with the epidemic, small and medium-sized enterprises are in a dilemma, leading to a wave of unemployment, making many people "revenge work" and "revenge saving”.

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2. Overview of China's tourism industry under the epidemic

2.1. Impact on the three major tourism markets

The epidemic has spread rapidly across the country, and with the further acceleration of my country's industrialization process, the more complete industrial chain, the high interdependence between industries, and the entry of my country's economy into a new normal from a period of rapid development, these factors have made the epidemic brought to the tourism industry. The negative impact of China's tourism industry has been multiplied, bringing huge negative impact to my country's three major tourism markets.

As far as the domestic tourism market is concerned, the domestic tourism market is particularly affected by the epidemic in the first half of 2020, and the impact on summer tourism still needs to be further judged based on the development of the epidemic[4]. According to preliminary statistics from the Ministry of Transport, during the 10-day Spring Festival holiday in 2020, about 190 million passengers were sent across railways, roads and waterways across the country, a drop of nearly 73% from the same period last year. After the nationwide epidemic prevention and control, air railways, online travel companies, travel agencies and hotels have experienced a wave of refunds and cancellations, and tourism companies such as tourist attractions and travel agencies have almost completely shut down.

As far as the inbound tourism and outbound tourism markets are concerned, measures such as travel warnings to China, suspension of air passenger transport, entry control from other countries, and my country's group outbound ban have not only caused heavy damage to China's inbound tourism market, but also my country's outbound tourism market has shrunk significantly[5]. Adding to the slowdown in the global international tourism market. First of all, in the short to medium term, the epidemic will have a direct negative effect on my country's inbound tourism market. According to data released by the China Tourism Academy, from the perspective of the whole year of 2019, the number of inbound tourists and international tourism revenue increased by 34.7% and 40.6%, respectively, a decrease of 50.32 million and 53.4 billion US dollars compared with the previous year[6]. After the global financial risk in 2008, my country's inbound tourism market changed its long-term high-speed growth trend. The annual growth rate did not exceed 5%, and even experienced negative growth in many years[7]. After the epidemic, the inbound tourism market will return to the previous level and achieve Continued growth will face huge challenges, and more efforts need to be made in terms of destination marketing and improving the supply chain of inbound tourism.

Secondly, the number of outbound tourists in my country has dropped sharply in the short term, and will gradually recover after the epidemic, but the recovery of the outbound market will be later than that of the domestic tourism market[8]. Thirdly, the United Nations World Tourism Organization said in a statement that in 2019, the number of international tourists in the world was about 1.5 billion, while the China Tourism Academy initially estimated that there were 160 million outbound tourists in China last year, accounting for more than 10% of the total number of international tourists in the world[9]. It can be seen that the epidemic will also have a greater impact on the global international tourism market.

From the demand side to the supply side, the negative impact of the epidemic on the tourism industry is systemic. On the one hand, the most direct impact of the epidemic on the tourism supply side is that in the first quarter, tourism companies suffered heavy losses and fell into survival risks, especially for weak SMEs, the risk of capital chain breakage and bankruptcy intensified. However,

On the other hand, this shutdown provides a buffer period for us to reflect on and solve the problems of supply and demand mismatch, product structure imbalance and repeated inefficient investment in the current tourism development[10]. After the tourism market recovers, in order to better meet the diversified needs of modern tourism, these high-quality assets that were "killed by mistake" and shelved in the risk will be quickly revitalized and acquired, and some other stock assets may also be integrated through cross-border integration, cultural import and other ways to regain vitality, so that the supply-side structural reform of the tourism industry has been further deepened.

2.2. Descriptive statistical analysis of the fundamentals of China's tourism industry

This paper analyzes the "fundamentals" of tourism by establishing a mathematical model to answer the confusion of tourism practitioners, and uses the model to predict the development of the domestic tourism market in the next three years.

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Through the collection and arrangement of relevant data on the website of the Bureau of Statistics, the main selected tourism industry-related data are: data on foreign exchange income from tourism in China, data on changes in the number of tourists in China, data on domestic tourism revenue in China, the number of domestic travel agencies in China, and domestic tourism agencies. Employment data, domestic tourism university data and foreign inbound tourists. Data analysis was carried out from this, and the specific descriptive statistical analysis process was as follows.

2.2.1. Foreign exchange income from tourism

The first is to analyze China's tourism foreign exchange income in the past 20 years:

As can be seen from the above figure, from 2000 to 2021, China's tourism foreign exchange revenue has maintained a steady and rapid development trend, which shows the importance of tourism foreign exchange revenue in ensuring the balance of China's recurrent foreign exchange revenue and is the basis for China's foreign exchange revenue. Income and balance of payments made a huge contribution. But in 2019, the foreign exchange earnings of Chinese tourism began to decline, indicating that the marginal growth rate of foreign exchange earnings from tourism is weakening.

2.2.2. Number of domestic residents traveling

In the past 20 years, the overall number of tourists in China has shown a gradual increase, which shows that the attractiveness of my country's tourism industry is increasing day by day. However, it can be observed that there was a decline in 2003, mainly due to the short-term trauma to the tourism industry caused by the occurrence of SARS, but it quickly rebounded after that. Compared with other years, the growth momentum in 2008 was also relatively flat, and it is speculated that it was mainly due to the intertwined effects of multiple unfavorable factors in that year, such as the ice and snow disaster at the beginning of the year, the "3.14" Tibet independence incident, the "5.12" earthquake in the middle of the year and the end of the year. Global financial risks have erupted in an all-round way and other factors. Although the 2008 Olympic Games also restricted the number of tourists that year to a certain extent due to security controls, the long-term benefits it brought are incalculable.

2.2.3. Domestic tourism revenue

Except for the special period, China's tourism revenue has been rising steadily in the past 20 years, and the development momentum is good. Since 2010, tourism consumption demand has grown explosively. In 2011, China's tourism industry has maintained a high level of operation, and the future tourism market is optimistic. It can be seen that with the development of my country's economy and society, the increase of residents' income, the acceleration of consumption upgrading, the gradual implementation of "paid leave", and the advent of the era of automobiles, tourism has increasingly become a large part of Chinese people's lives.

2.2.4. Number of travel agencies

The number of domestic travel agencies maintains a rapid growth trend, and the vast tourism market provides a fertile soil for the growth of China's travel agency industry. Data show that the number of travel agencies nationwide has grown from 8,993 in 2000 to 32,888 in 2019. While the number of travel agencies in my country continues to grow, we should also continue to pay attention to the improvement of quality. Travel agencies should continuously accumulate business awareness and management experience through market-oriented operation, expand the scale economy of travel agencies, provide the degree of concentration and unit operation scale, and gradually form a huge industry system.

2.2.5. Number of employees in travel agencies

The number of direct employment in travel agencies increased from 164,336 in 2000 to 388,875 in 2019. However, the growth rate has slowed down since 2013. It can be seen that there are still problems in the construction of my country's tourism talent team that the quantity, quality and structure of talents are not suitable for the rapid development of tourism. Therefore, on July 3, 2017, the Office of the National Tourism Administration issued a notice to print and distribute the "Thirteenth Five-Year Plan for Tourism Talent Development Plan". Innovative and entrepreneurial talents. As a result, 2019 saw a rapid growth.

2.2.6. Number of domestic tourism universities

While the overall number of higher tourism colleges in my country is growing rapidly, it also shows a certain degree of shrinkage. By 2013, the number of higher tourism colleges showed negative growth

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for the first time. It can be seen that the phenomenon of high industry loss is mainly due to the low employment rate of graduates from tourism colleges in my country. There has always been a shortage of talents in my country's tourism industry, so we should continue to pay more attention to the problem of my country's tourism undergraduate education.

2.2.7. Number of inbound foreign tourists

Statistical analysis of the number of inbound foreign tourists in recent years shows that the overall number of inbound tourists from abroad is increasing, but it reached a low point in 2003, dropped significantly in 2008, and continued to decline in 2009. In 2003, it was mainly affected by the "SARS incident", and similar to the new crown epidemic, it caused trauma to the tourism industry. In 2008, under the comprehensive influence of various natural disasters, political events and international financial risks, the number of inbound foreign tourists in 2008 was 24.3253 million, a decrease of 6.8%. In 2009, international economic risks became the most important factor affecting the number of inbound foreign tourists. In the past 20 years, compared with the previous 10 years, the growth rate in the next 10 years was obviously relatively flat. It can be seen that, apart from the impact of various special events, the continuous appreciation of the RMB and the continuous rise in prices have also increased the travel costs of overseas tourists. In addition, China's haze weather, tourism order and service environment have also caused a decrease in the number of overseas tourists. . Under such circumstances, the Chinese tourism industry must focus on improving the quality of Chinese tourism and further relax restrictions on the tourism market in order to attract more overseas tourists.

3. Model Analysis

In this paper, multiple regression model and grey prediction model are used for modeling analysis. First, a mathematical model that affects the development of tourism is constructed. Then, the GM (2,1) model is used to predict the data of the basic indicators of tourism, and the study of tourism in the next three years is carried out. The data collected in this paper and the angle of consideration of the problem are shown in the following figure:

3.1. Tourism foreign exchange income model

The first consideration is "foreign exchange earnings in China's tourism market", and the influence of other independent variables on this factor is studied.

Table 1: Model results of influencing factors of foreign exchange income in China's tourism market

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	-55.1294721377372
Employed population	X2	60.5227168643638
employment rate	X3	-1.63753518792506
gross domestic product	X4	2.50221587782000
Fixed asset investment	X5	-0.850311274576437
Import and export trade volume	X6	0.591267573051242
Gross energy production	X7	-2.15177057541780
national revenue	X8	0.201097428835674
price consumption index	X9	-4.83056112822638
Number of catering companies	X10	0.183529925905803
number of health workers	X11	0.228152073420863
Number of people participating in pension insurance	X12	-0.205487352048573
R 2 = 0.9912 F = 82.1898 P = 0		

Through the modeling analysis of matlab software, the relevant impact "foreign exchange income of China's tourism market" model is obtained as follows:

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$$\ln y_1 = -55.13\ln x_1 + 60.52\ln x_2 - 1.64\ln x_3 + 2.50\ln x_4 - 8.50\ln x_5 + 0.59\ln x_6 - 2.15\ln x_7 + 0.20\ln x_8 - 4.83\ln x_9 + 0.18\ln x_{10} + 0.23\ln x_{11} - 0.21\ln x_{12}$$

3.2. Model of the number of domestic resident tourists

Taking "the number of domestic resident tourists" as the dependent variable, the influence of other independent variables on the number of domestic resident tourists in China is studied. The model results obtained by matlab software are as follows:

Table 2: Model Results Table of Influencing Factors of Chinese Resident Tourists

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	73.8592354972983
Employed population	X2	-77.2011680478699
employment rate	X3	-0.142938572929144
gross domestic product	X4	-6.98644262404502
Fixed asset investment	X5	0.542581952055350
Import and export trade volume	X6	0.680645905864910
Gross energy production	X7	0.452229561332694
national revenue	X8	3.82517596748349
price consumption index	X9	0.419243000794575
Number of catering companies	X10	0.278767390315328
number of health workers	X11	1.49202552006028
Number of people participating in pension insurance	X12	1.03254633259603
R 2 = 0.9984 F = 459.5082 P = 0		

The above results describe the relevant influencing factors that affect the number of tourists in China, that is, the model is:

$$\ln y_2 = 73.86\ln x_1 - 77.20\ln x_2 - 0.14\ln x_3 - 6.99\ln x_4 + 0.54\ln x_5 + 0.68\ln x_6 - 0.45\ln x_7 + 3.83\ln x_8 + 0.42\ln x_9 + 0.28\ln x_{10} + 1.49\ln x_{11} + 1.03\ln x_{12}$$

3.3. Domestic tourism revenue model

Table 3: Model Results of Influencing Factors of China's Domestic Tourism Revenue

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	63.1490558268325
Employed population	X2	-67.1894537180482
employment rate	X3	-0.501241499665720
gross domestic product	X4	-8.67678909240700
Fixed asset investment	X5	0.186810496440844
Import and export trade volume	X6	0.599057205923356
Gross energy production	X7	0.701655667240907
national revenue	X8	4.72276869261175
price consumption index	X9	1.06147191618434
Number of catering companies	X10	0.339585024096269
number of health workers	X11	2.08841334624332
Number of people participating in pension insurance	X12	3.71201792746724
R 2 = 0.9986 F = 508.6681 P = 0		

Study the "fundamentals" of the tourism industry - "domestic tourism revenue", take this quantity as the dependent variable, and other quantities as independent variables, build a model for research, and

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the model results obtained are shown in the Table 3.

That is, the impact model of China's domestic tourism revenue is obtained as:

$$\ln y_3 = 63.15\ln x_1\text{-}67.19\ln x_2 - 0.50\ln x_3\text{-}8.68\ln x_4 + 0.19\ln x_5 + 0.60\ln x_6 + 0.70\ln x_7 + 4.73\ln x_8 + 1.06\ln x_9 + 0.34\ln x_{10} + 2.09\ln x_{11} + 3.71\ln x_{12}$$

3.4. Travel agency quantity model

Taking "the number of travel agencies" as the dependent variable, a modeling analysis was conducted to study the influence of other factors on the "fundamentals" of the tourism industry - "the number of travel agencies". The model obtained is as follows:

Table 4: Model Results Table of Factors Influencing the Number of Travel Agencies in China

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	15.4404827135257
Employed population	X2	-15.6498166692500
employment rate	X3	0.668128428284510
gross domestic product	X4	-0.905623029816951
Fixed asset investment	X5	0.0198758294924254
Import and export trade volume	X6	0.382358976441925
Gross energy production	X7	0.242689605523017
national revenue	X8	0.649903663644213
price consumption index	X9	-0.325199078782099
Number of catering companies	X10	0.0404618423294609
number of health workers	X11	0.631728652692807
Number of people participating in pension insurance	X12	-0.403896136067417
R 2 = 0.9986 F = 501.6522 P = 0		

That is, the mathematical model that affects the number of travel agencies in China is:

$$\ln y_4 = 15.44\ln x_1\text{-}15.65\ln x_2 + 0.69\ln x_3\text{-}0.91\ln x_4 + 0.02\ln x_5 + 0.38\ln x_6 + 0.24\ln x_7 + 0.65\ln x_8\text{-}0.33\ln x_9 + 0.04\ln x_{10} + 0.63\ln x_{11}\text{-}0.40\ln x_{12}$$

3.5. Quantity model of tourism colleges

Table 5: Result table of factors influencing the number of tourism colleges in China

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	4.01973435770619
Employed population	X2	-3.36286165457026
employment rate	X3	-1.83639147481274
gross domestic product	X4	0.499188528814275
Fixed asset investment	X5	0.0130947190556134
Import and export trade volume	X6	-0.380102996452479
Gross energy production	X7	-0.654592344260097
national revenue	X8	0.0439778768600489
price consumption index	X9	0.349830414244139
Number of catering companies	X10	-0.0400171343003412
number of health workers	X11	-4.05066485777405
Number of people participating in pension insurance	X12	3.17775128073508
R 2 = 0.9733 F = 26.4978 P = 0		

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Taking "the number of tourism colleges" as the dependent variable, and other economic and social fundamental data as the independent variables, the modeling analysis is carried out, and the modeling results obtained are shown in the Table 5.

The influencing factor model of Chinese tourism colleges is obtained as follows:

$$\ln y_5 = 4.02\ln x_1 - 3.36\ln x_2 - 1.84\ln x_3 - 0.50\ln x_4 + 0.01\ln x_5 - 0.38\ln x_6 - 0.65\ln x_7 + 0.04\ln x_8 + 0.35\ln x_9 - 0.04\ln x_{10} - 4.05\ln x_{11} - 3.18\ln x_{12}$$

3.6. Model of the number of inbound foreign tourists

Taking "the number of inbound foreign tourists" as the dependent variable and other factors as independent variables, a mathematical model was constructed using matlab software, and the model results obtained are as follows:

Table 6: Model Results Table of Influencing Factors of Inbound Foreign Tourists

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	-40.6943035684927
Employed population	X2	45.3608205163285
employment rate	X3	-0.657369161975265
gross domestic product	X4	3.66088940423407
Fixed asset investment	X5	-0.929693589215386
Import and export trade volume	X6	1.10438961674015
Gross energy production	X7	-2.20479888797857
national revenue	X8	-0.938308990725588
price consumption index	X9	-4.38433354739794
Number of catering companies	X10	0.107518124806287
number of health workers	X11	-0.129683432210800
Number of people participating in pension insurance	X12	-1.10310759906606
R 2 = 0.9758 F = 29.3486 P = 0		

Running the results through matlab software, the model results obtained are:

$$\ln y_6 = -40.69\ln x_1 + 45.36\ln x_2 - 0.66\ln x_3 + 3.66\ln x_4 - 0.93\ln x_5 + 1.10\ln x_6 - 2.20\ln x_7 - 0.94\ln x_8 - 4.38\ln x_9 - 0.11\ln x_{10} - 0.13\ln x_{11} - 1.10\ln x_{12}$$

3.7. Travel agency employment model

Select "employment of travel agency" as the dependent variable, build a model to analyze the influence of other factors on "employment of travel agency", and the obtained model results are shown in the following figure:

Table 7: Model results of influencing factors of employment in travel agencies

Independent variable indicator	Corresponding letters of independent variable indicators	Coefficient size
Permanent population	X1	98.5111234598131
Employed population	X2	-99.3805824963685
employment rate	X3	0.374609478189028
gross domestic product	X4	-9.09404284386307
Fixed asset investment	X5	0.353714253735178
Import and export trade volume	X6	0.889510865537613
Gross energy production	X7	-0.164829237417621
national revenue	X8	5.70299520223088
price consumption index	X9	-0.412966550618670
Number of catering companies	X10	0.468656401284984
number of health workers	X11	1.24807692683066
Number of people participating in pension insurance	X12	-0.522075339698459
R 2 = 0.9839 F = 44.4883 P = 0		

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That is, the model is:

$$\ln y_7 = 98.51\ln x_1 - 99.38\ln x_2 + 0.37\ln x_3 - 9.09\ln x_4 + 0.35\ln x_5 + 0.89\ln x_6 - 0.16\ln x_7 + 5.70\ln x_8 - 0.41\ln x_9 + 0.47\ln x_{10} + 1.25\ln x_{11} - 0.52\ln x_{12}$$

And use matlab to carry out the correlation test and analysis of the model, study the correlation between the respective variable factors and the model, and test and analyze the residual error of the model, and obtain the following figure:

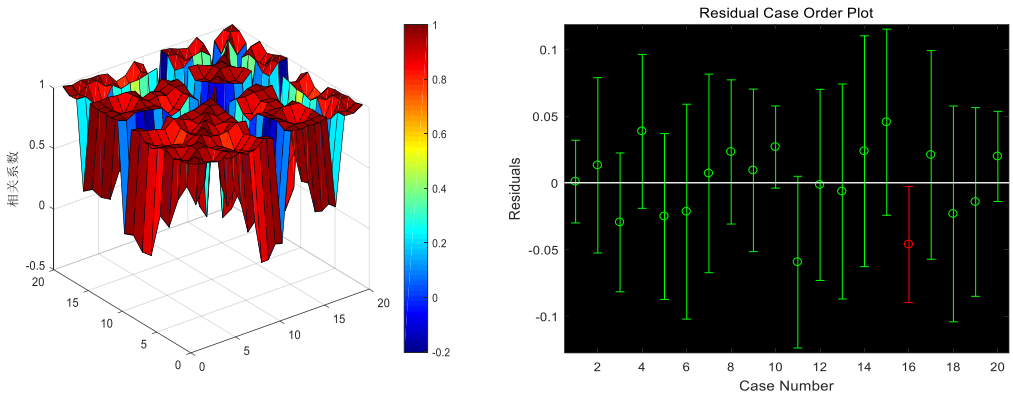

Figure 1: Model Correlation Test and Analysis of Residual Results

According to the test results of all models, the "fundamentals" models of the tourism industry have good effects and can better reflect the development of China's tourism market. From the three-dimensional map of the correlation coefficient, the colors are relatively dark, indicating that the model There is a high correlation between the dependent variable and each independent variable. From the residual result graph, basically all the data are within a reasonable range, and there is no situation where the residual is too large. The specific tests of each model are shown in the following table:

Table 8: Summary and Test Table of Tourism Industry "Fundamentals" Model Results

Tourism industry "fundamentals" model	model expression	test
Foreign exchange earnings from tourism market	$\ln y_1 = -55.13\ln x_1 + 60.52\ln x_2 - 1.64\ln x_3 + 2.50\ln x_4 - 8.50\ln x_5 + 0.59\ln x_6 - 2.15\ln x_7 + 0.20\ln x_8 - 4.83\ln x_9 + 0.18\ln x_{10} + 0.23\ln x_{11} - 0.21\ln x_{12}$	R2 = 0.9912 _
Number of resident tourists	$\ln y_2 = 73.86\ln x_1 - 77.20\ln x_2 - 0.14\ln x_3 - 6.99\ln x_4 + 0.54\ln x_5 + 0.68\ln x_6 - 0.45\ln x_7 + 3.83\ln x_8 + 0.42\ln x_9 + 0.28\ln x_{10} + 1.49\ln x_{11} + 1.03\ln x_{12}$	R2 = 0.9984 _
tourism revenue	$\ln y_3 = 63.15\ln x_1 - 67.19\ln x_2 - 0.50\ln x_3 - 8.68\ln x_4 + 0.19\ln x_5 + 0.60\ln x_6 + 0.70\ln x_7 + 4.73\ln x_8 + 1.06\ln x_9 + 0.34\ln x_{10} + 2.09\ln x_{11} + 3.71\ln x_{12}$	R2 = 0.9986 _
Number of travel agencies	$\ln y_4 = 15.44\ln x_1 - 15.65\ln x_2 + 0.69\ln x_3 - 0.91\ln x_4 + 0.02\ln x_5 + 0.38\ln x_6 + 0.24\ln x_7 + 0.65\ln x_8 - 0.33\ln x_9 + 0.04\ln x_{10} + 0.63\ln x_{11} - 0.40\ln x_{12}$	R2 = 0.9986 _
Number of tourism schools	$\ln y_5 = 4.02\ln x_1 - 3.36\ln x_2 - 1.84\ln x_3 - 0.50\ln x_4 + 0.01\ln x_5 - 0.38\ln x_6 - 0.65\ln x_7 + 0.04\ln x_8 + 0.35\ln x_9 - 0.04\ln x_{10} - 4.05\ln x_{11} - 3.18\ln x_{12}$	R 2 = 0.9733
Number of inbound foreign tourists	$\ln y_6 = -40.69\ln x_1 + 45.36\ln x_2 - 0.66\ln x_3 + 3.66\ln x_4 - 0.93\ln x_5 + 1.10\ln x_6 - 2.20\ln x_7 - 0.94\ln x_8 - 4.38\ln x_9 - 0.11\ln x_{10} - 0.13\ln x_{11} - 1.10\ln x_{12}$	R2 = 0.9758 _
Employment in travel agencies	$\ln y_7 = 98.51\ln x_1 - 99.38\ln x_2 + 0.37\ln x_3 - 9.09\ln x_4 + 0.35\ln x_5 + 0.89\ln x_6 - 0.16\ln x_7 + 5.70\ln x_8 - 0.41\ln x_9 + 0.47\ln x_{10} + 1.25\ln x_{11} - 0.52\ln x_{12}$	R2 = 0.9839 _

Then use the grey forecasting model to forecast the "fundamental" data of the tourism industry, and analyze the development of the tourism market in the next three years.

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4. Grey forecasting model

The grey model can be used for forecasting a variety of real situations and has a good forecasting effect. This paper uses the GM(2,1) model in the grey forecasting model to forecast the development of the tourism market in the next three years.

The development of the domestic tourism market is predicted through the GM(2,1) model, and the results of the above prediction are summarized, as shown in the following table:

Table 9: Forecast of the relevant indicators of tourism market development in the next three years

Relevant indicators of tourism market development	2022 _ _	2023 _ _	2024 _ _
Foreign exchange earnings from domestic tourism (unit: US$ million)	26324.49	24377.85	22588.39
The number of domestic resident tourists (unit: 100 million people)	51.97	48.00	44.79
Domestic tourism revenue (unit: 100 million yuan)	42965.59	39022.04	38101.09
Number of domestic travel agencies (unit: home)	34201.16	35350.73	36487.92
Travel agency employees (unit: person)	441656.19	455566.46	468744.23
Number of domestic tourism colleges (unit: institute)	2363.86	2233.57	2144.02
Number of inbound foreign tourists (unit: 10,000 person-times)	3655.44	3736.61	3789.60

From the forecast results of the GM(2,1) model, tourism foreign exchange income will show a downward trend in the next three years; the number of domestic resident tourists will show a downward trend in the next three years; domestic tourism revenue will show a downward trend in the next three years. The number of travel agencies will show an upward trend in the next three years; the number of tourism colleges will show a downward trend in the next three years; the number of inbound foreign tourists will show an upward trend in the next three years; the employment of travel agencies will increase in the next three years. Three years will show an upward trend; overall, the development of China's tourism market is stable and improving. Affected by the epidemic, some indicators will decline in the next three years, but there is a lot of room for improvement. As long as appropriate measures are taken to make adjustments, There is still much room for improvement.

5. Conclusion

The results of the GM(2,1) model of the multiple regression model also answered the confusion of tourism practitioners to a certain extent. Some people are optimistic about the development of tourism after the epidemic, while some people are more pessimistic. Attitude, because each of them only saw the changes in certain factors in the "fundamentals", and did not look at the issue from an overall perspective. From an overall perspective, the development of the tourism industry after the epidemic will mainly depend on national policies. The combination of macro-control and market economy, through correct guidance, will help drive the development of the tourism industry.

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