Study on the influence of leisure sports consumption on the economic benefits of sports industry based on Logistic model

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Abstract: In the development of modern economic construction, as one of the positive industries, the sports industry has a positive impact on the social and economic innovation and development. According to the situation of leisure sports consumption in recent years, as the basic component of sports industry, this paper deeply explores the relationship between leisure sports consumption and sports industry economy, and can work out more effective measures for economic construction and development on the basis of solving the problems of leisure sports consumption under the new normal. Therefore, based on the understanding of leisure sports consumption and the economic development trend of the sports industry, this paper combined with the Logistic model mainly discusses the development status of the sports industry in a certain region, and then develops more perfect economic management measures.

Keywords: Logistic model; Leisure sports; Household consumption; Sports industry; Economic benefits

1. Introduction

In essence, leisure sports consumption refers to the social and cultural consumption phenomenon including entertainment and fitness, which is regarded as an important index to evaluate the quality of life of a country or region in the current social and economic development. In the innovative development of Chinese economic construction, when the sports industry provides sports products services to the social residents, it fully satisfies their fitness life demand, and as one component, the leisure sports consumption has close relation between the two. Based on the analysis of the relationship among consumption concepts, time and money at different stages as shown in Table 1 below, it can be seen that different consumption levels and consumption structure affect the overall development speed and scale expansion of the industry. For example, in the development of agricultural society, social residents are not willing to participate in leisure sports consumption independently. However, after entering the knowledge society, social residents pursue material needs while pursuing sports consumption. Pay more attention to meet their own physical and mental health and spiritual pleasure, which is also an important condition to promote the rapid development of the sports industry.[1-3]

Table 1 Analysis of the relationship among consumption concept, time and money at different stages

Stage of development	View of consumption	Leisure values	View of happiness	Time and money
An agricultural society	Frugality	Labor is supreme, leisure is evil	Content	Free time and no money.
Industrial society	Enjoyment and consumption	Work is first, leisure is for labor	Goods and services	Rest and cultural entertainment
The knowledge	Physical and mental health,	Work is for leisure	Things, service and time	Have time and money

| society	spiritual happiness, self-development			

According to the analysis of the scale of Chinese sports consumption market and the per capita development trend of sports consumption , we know that the development of Chinese leisure sports industry in recent years mainly faces the following problems: First, the consumption concept is influenced by the traditional concept, and the basic principle observed by the social residents is thrift. According to the practical survey and research, the average savings of Chinese residents is more than 40,000 yuan, which is the rare high savings country in the world. In order to further mobilize the purchase desire of the social residents, the state has put forward a variety of macro-control methods, but the practical application results show that the residents' leisure sports consumption is not much, which directly restricts the development of the leisure sports industry. Secondly, sports consumption demand is obviously not high. In the social and economic reform development in our country, the urban and rural residents' income level is increasingly higher, which lays the solid foundation for modern leisure sports consumption. But from the perspective of practical development, at present our leisure sports consumption demand is still in the low level, social residents' demand is not; Finally, the infrastructure is lagging too far. Compared with the developed countries, the existing leisure sports facilities construction level is too stereotypical, which is also the main problem facing the development of industry economy. Nowadays, most of our leisure sports facilities are mainly concentrated in the urban center, the urban suburbs or rural areas with a small number of distribution, which leads to the unbalanced distribution of leisure and entertainment consumption, and the comprehensive development level is relatively backward. According to the results of practical survey and research, the quality and quantity of leisure sports venues in our country are far from the standards of developed countries. Therefore, in the future research and innovation, we should pay attention to strengthening the construction and management level of sports infrastructure, so as to stimulate the level of leisure sports consumption of local residents.[4-6]

In the process of social economy and technological innovation and development, China is paying more and more attention to the economic benefits of the sports industry. With the increasing investment of the sports industry in recent years, the research on leisure sports consumption from all walks of life is becoming stronger and stronger. Various preferential policies speed up the communication between China and other countries and provide a new idea for the reform and development of the economic construction of the sports industry. This paper mainly uses the Logistic model to discuss the influence of leisure sports consumption on the economic benefit of the sports industry, and then from the long-term development perspective of the industry economy, puts forward appropriate measures for construction and development, in order to create favorable conditions for the reform of the sports industry.

2. Methods

2.1 Logistic Model

When the Logistic model is applied, it can be divided into two modes: on the one hand, the binary model, basic logistic regression will be chosen; On the other hand, it refers to the multi-classification model and will choose multi-classification logistic regression. According to the regression model analysis shown in Figure 1 below, the Logistic model has the following requirements:[7-9]
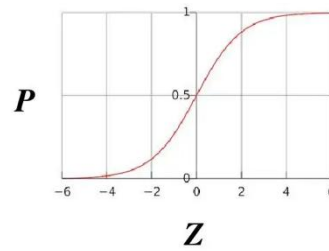
$$Z = \beta_0 + \beta_1 x_1 + ... + \beta_m x_m$$

Figure1 Regression model

First, the dependent variable (outcome) is a binary variable;

Second, there is at least one independent variable, which can be either continuous variable or classified variable.

Third, each observation is independent of the other. The classification of classification variables (including dependent variables and independent variables) must be comprehensive and mutually exclusive.

Fourth, the minimum sample size is required to be 15 times the number of independent variables, but some researchers believe that the sample size should be 50 times the number of independent variables.

Fifth, there is a linear relationship between the logit conversion values of the continuous independent variable and the dependent variable.

Sixth, there is no multicollinearity between independent variables.

Seventh, there are no obvious outliers, leverage points and strong influence points.

From the perspective of practical application, when the Logistic model is used to solve problems, the results of logistic regression are usually used to estimate the possibility of something, and can not be directly used as the probability value. The result is often used for weighted summation with other eigenvalues rather than direct multiplication. Logistic regression can be used to predict the probability of system or product failure during a given process. It is also used in marketing applications, such as predicting a customer's propensity to buy or disorder a product. In economics it can be used to predict the likelihood that a person will choose to enter the Labour market, and in business it can be used to predict the likelihood that a homeowner will default on a mortgage. According to the logistic regression model, the probability of occurrence of a certain disease or a certain situation can be predicted under different independent variables. The trauma and injury severity rating, originally developed by Boyd et al., has been widely used to predict mortality in injured patients, using logistic regression to analyze and predict the risk of developing specific diseases based on observed patient characteristics such as age, sex, body mass index, and the results of various blood tests. In addition, logistic regression models are now the basis of many classification algorithms.[10-13]

From the perspective of principle, logistic regression is regarded as a linear regression model. It is assumed that the dependent variable y obeys Bernoulli distribution, and Sigmoid mapping function is used to implement it on the basis of linear regression. It is mainly used for classification. It adds sigmoid function on the basis of linear regression, inputs the result of linear regression into sigmoid function, and sets a threshold, if it is greater than the threshold value is 1, if it is less than the threshold value is 0. The Sigmoid function introduces nonlinear factors, so the 0/1 classification problem can be easily handled. The calculation formula of standard linear regression is as follows:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + ... + \beta_k x_{ki} + \mu_i$$

$Write \quad It \quad As \quad A \quad Vector \quad \mathrm{Pr}oduct \quad y_i = x_i'\beta + u_i (i = 1,2,...,n)$

The calculation formula of logistic regression is as follows:

$$\begin{cases} P(y=1|x)=F(x,\beta) \\ P(y=0|x)=1-F(x,\beta) \end{cases} Note：\; General \;\; F(x,\beta)=F(x'_i,\beta)$$

The calculation formula of the core function is as follows:

$$S(x)=\frac{\exp(x)}{1+\exp(x)}$$

2.2 Research Objectives

This paper mainly discusses the influence of leisure sports consumption on the economic benefit composition of the sports industry. The sports industry increase value is the basic index proposed by the General Administration of Sport of China and the Bureau of Statistics to evaluate the development of the sports industry, which is regarded as the basic content of industrial economic construction and development. The sports industry increase value of a certain region from 2010 to 2018 is systematically collected. Clear the local GDP economic development situation, so as to conduct model research and analysis.

2.3 Research Methods

First of all, the literature method. Collect relevant literature from libraries and network platforms to comprehensively understand the impact of sports industry on economic development at home and abroad, and then determine the main direction of empirical analysis after collection and collation; Secondly, mathematical statistics. Statistical analysis of the sports industry, leisure sports consumption, national economic development and other related data of a region from 2010 to 2018, using data tables to visually present the trend of change and specific relationship among the three, and then provide data support for the subsequent research; Finally, Logistic model analysis. Logistic model was used to study the specific trend of the increase value of the sports industry in a certain region, and marginal effect, inflection point characteristics and elasticity analysis in economics were used to clarify the influence of leisure sports consumption on the economic development of the local sports industry, so as to lay the foundation for subsequent innovative research.

3. Result analysis

3.1 Model Analysis

Based on the current situation of economic construction and development in a certain region, this paper focuses on the increasing value of sports industry and its influence on the local economic development. Since economic growth is affected by productivity, labor quantity, investment quantity and other factors, under limited environmental conditions, the total economic growth will first rise slowly and then increase rapidly, and the actual growth rate will slowly decline after the influence of resistance becomes more and more serious. The Logistic model is shown as follows:[14.15]

$$y=\frac{K}{1+ae^{-rx}}$$

In order to further explore the parameters in the model, the model should be linearized, and the specific results are as follows:

$$\frac{1}{y}=\frac{1+ae^{-rk}}{K}$$

Take the logarithm of both sides and you get:

$$ln\left(\frac{K}{y}-1\right)=\ln a-rx$$

$$Y = ln\left(\frac{K}{y} - 1\right), A = \ln a, B = -r, X = x$$

Assuming , the linear equation as follows can be obtained: $Y = A + Bx$

3.2 Experimental Results

First, marginal analysis. Based on the analysis of the data results of the study area, it can be seen that the marginal amount of local leisure sports consumption will continue to rise compared with the increase figure of the sports industry. However, because the industrial structure of leisure sports consumption is not balanced, it directly limits the increase of the marginal amount. Therefore, in the future construction and development of the sports industry, we should pay attention to improving the consumption structure of leisure sports. Second, the elastic coefficient. Based on the data analysis of the study area, it can be seen that the increase value of local leisure sports consumption exceeds that of the sports industry, which proves that the strength of leisure sports is far greater than the demand. Therefore, when the local government puts forward various measures to promote the high-quality development of the sports industry, it clearly requires the transformation and upgrading of the sports manufacturing industry and the formulation of more perfect industrial policies. Finally, the inflection point analysis. From 2010 to 2015, the increase in the local sports industry has promoted the economic construction and development, and the level of sports and leisure consumption has become higher and higher. However, after entering 2016, the local sports industry increased its quality, and its contribution to economic development became weaker and weaker, which proved that 2016 was an inflection point for the development and construction of the local sports industry. According to the problems of industrial economic construction and development mastered at this stage, more perfect management measures should be formulated to continuously optimize the consumption pattern of leisure sports, which can not only improve the economic benefits of the sports industry, but also provide better service products for social residents.

Combined with the analysis of the five-year forecast results shown in Table 2 below, it can be seen that the increase value of local sports industry is getting higher and higher, which has a positive impact on social and economic construction and development. However, both the marginal effect and the elastic coefficient are gradually declining, which proves that sports leisure consumption has reached a certain level, and the economic effect of sports industry on social economy is getting lower and lower. In order to further improve the economic benefits of the local sports industry and give full play to its own positive role, it is necessary to not only transform the traditional leisure sports consumption and operation mode, promote the local leisure sports culture construction and promotion, but also put forward a number of preferential policies to ensure the healthy and stable development of the sports industry, as shown in Figure 2 below:

Table 2 Forecast results of local sports industry data

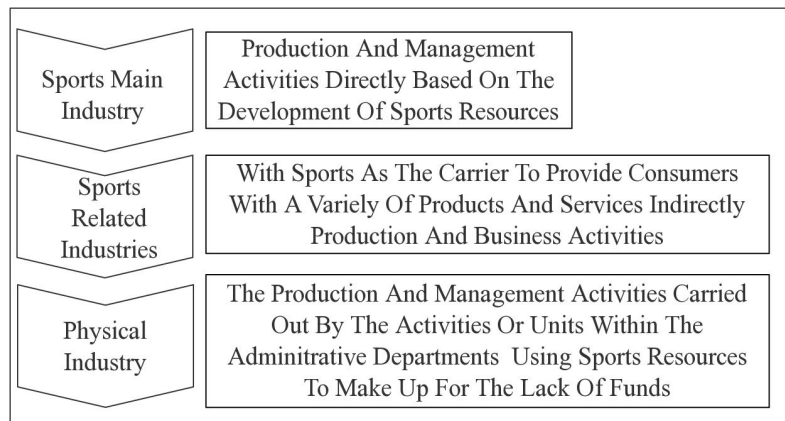| Forecast year	GDP	Added value of sports industry	Marginal effect	Coefficient of elasticity
2019	3.7246 trillion	144.32 billion	23.38659	0.9515587
2020	3.9680 trillion	1556.0 billion	22.65956	0.9261722
2021	4.2114 trillion	1668.8 billion	21.64549	0.8903793
2022	4.4548 trillion	1781.6 billion	20.39811	0.8462965
2023	4.6982 trillion	1894.4 billion	18.97830	0.7960638

Figure 2. Development direction of sports industry in the future

Conclusion

In conclusion, the integrated use of Logistic model to study the impact of leisure sports consumption on the economic benefits of the sports industry can provide an effective basis for the development and management of social economic construction in the new era. Therefore, in the future, scholars should not only attach importance to leisure sports consumption and sports industry innovation, but also reasonably use the Logistic model for empirical analysis, strengthen the training of professional and technical talents, and actively introduce advanced technology theory innovation, so as to build a more standardized and scientific sports industry development mode.

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