An evaluation model of sustainable development of sports tourism industry based on matter-element theory

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Abstract

The sustainable development of sports tourism industry is concerned with many factors. Its evaluation is a complex system engineering. This paper studies the complexity and diversity of factors that influence the sustainable development of sports tourism industry and proposes an evaluation model of sustainable development based on matter-element theory. An indicator system is put in place. Evaluation indicators of classical field matter-elements model, section domain matter-element model and evaluation objects matter-element model are constructed based on matter-element theory. Different methods of calculating extension degree are adopted according to characteristics of the evaluation objects matter-element model to calculate the comprehensive extension degree between evaluation objects matter-element model and classical field matter-elements model. This extension degree refers to the layer of sustainable development capability of evaluation objects. It will provide strategic support for the development of sports tourism industry. Case study has proved that the model and the algorithm are effective.

Keywords: sports tourism industry; sustainable development; matter-element theory; extension degree; evaluation model

1 Introduction

With social and economic development, people have a higher requirement on life quality and their lifestyles become diversified. While enjoying a wealthy life, they are paying more attention to their health. Sports tourism industry is an emerging tourism industry. On one hand, it brings spiritual experience to tourism. On the other, it integrates sports into tourism to reach the purpose of health cultivation. Sports tourism industry is expected to have a bright future [1-4].

Limited by regions and populations, sports tourism industry needs long-term, sustainable and rapid development. And it is significant to evaluate the industry's ability to achieve sustainable development [5-8]. However, such evaluation is complicated given that many factors have to be taken into account. Some factors can be quantified and clear while others are fuzzy and require qualitative descriptions.

Thus, this paper draws merits from previous researches and proposes an evaluation model of the sustainable development of sports tourism industry based on matter-element theory [9-14]. Then the grade of the ability to achieve sustainable development is acquired. Case study proves that the model and the algorithm are feasible and effective.

2 Indicator system of Sustainable development of sports tourism evaluation

Generally speaking, the boom of the sports tourism industry has much to do with geographical locations. Though it is one of the shining points of this industry, destruction on environment may also bear its own consequences. Therefore, many factors should be taken into consideration to evaluate the ability to achieve sustainable development of sports tourism industry. Scientific, objective and effective indicators are selected tailored to real situation. Service-oriented purpose should also be emphasized to select comprehensive, key and feasible indicators.

Therefore, this paper analyzes common indicators from five perspectives, namely, social factors, economic factors, environmental factors, sports factors and tourism factors and constructs a scientific and effective indicator system of sustainable development of sports tourism evaluation, as is shown in Table 1.

TABLE 1 Indicator system of Sustainable development of sports tourism evaluation

Target layer	Criterion layer	Indicator layer
Indicator system of Sustainable development of sports tourism evaluation A	social factors A_1	upgrading of regional social force a_{11}
		government support a_{12}
		tourist satisfaction a_{13}
		public support a_{14}
		sustainable development of related industries a_{15}
	economic factors A_2	input cost a_{21}
		investment returns a_{22}
		market growth a_{23}
		sustainable industry scale a_{24}

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	environmental factors A_3	ecological environment protection a_{31}
		influence on residents a_{32}
		sustainable environment protection efforts a_{33}
	sports factors A_4	green life a_{41}
		sports event brand a_{42}
		sports event appeal a_{43}
		sports event competitiveness a_{44}
	tourism factors A_5	low-carbon tourism a_{51}
		tourism event brand a_{52}
		tourism event appeal a_{53}
		tourism event competitiveness a_{54}

3 Evaluation model of Sustainable development of sports tourism based on matter-element theory

3.1 MATTER-ELEMENT THEORY

As one of the pillars of Extenics, matter-element theory has a promising future. The analysis is based on matter-element design or object analysis and adopts extension qualitative and quantitative analysis with matter-element as the logic cell. A comprehensive use of extension mathematics, extension transformation and extension logic is adopted to address the problems as a part of the extension engineering.

Matter-element, as one of the logic cells of Extenics, describes the design objects by constructing a sequence groups with three elements $R=(N,C,V)$. N refers to the name of the design object. C refers to matter-element characteristics of the design object and V refers to the value of a quantity of the design object N about matter-element characteristic C. If the design object has only one characteristic, then $R=(N,C,V)$ is the matter-element extension model with one dimension, which is called the basic element; In particular, if the object has multiple characteristics, $R=(N,C,V)$ is the matter-element extension model with multiple dimensions. At this moment,

$$C=(c_1,\cdots,c_i,\cdots,c_n)^T,$$

$$V=(v_1,\cdots,v_i,\cdots,v_n)^T,$$

n refers to the number of dimensions of $R=(N,C,V)$. Extension distance can be used to measure the extension correlation degree between matter-element models or matter-element characteristics. Suppose the matter-element characteristics of the reference object is $X=[x_1,x_2]$, that of the target object is v, then the extension distance ρ between the two is:

$$\rho=\left|v-\frac{x_1+x_2}{2}\right|-\frac{x_2-x_1}{2}. \tag{1}$$

3.2 CONSTRUCTING THE MATTER-ELEMENT MODEL OF THE SUSTAINABLE DEVELOPMENT OF SPORTS TOURISM INDUSTRY

Definition 1 Matter-element in classic field for sustainable development evaluation the sustainable development of the sports tourism industry is in different states or has different evaluation grade. Every state or grade corresponds to a characteristic value of the matter-element model.

Thus, suppose there are n characteristics $c_1,c_2,\cdots c_n$ and their corresponding values of a quantity are $v_1,v_2,\cdots v_n$. Construct the evaluation matter-element model $R_n^C(i)$, which is the matter-element in classic field for sustainable development evaluation.

$$R_n^C=\begin{bmatrix} N_C & c_1 & v_1(i) \\ & c_2 & v_2(i) \\ & \vdots & \vdots \\ & c_n & v_n(i) \end{bmatrix}=\begin{bmatrix} N_C & c_1 & [v_1^L(i),v_1^R(i)] \\ & c_2 & [v_2^L(i),v_2^R(i)] \\ & \vdots & \vdots \\ & c_n & [v_n^L(i),v_n^R(i)] \end{bmatrix}. \tag{2}$$

Definition 2 Matter-element in section field for sustainable development evaluation Section field is defined as the collection of the development state or evaluation grade of sustainable development of the sports tourism industry.

The extreme values of n characteristics $c_1,c_2,\cdots c_n$ and their values of a quantity are part of the section field matter-element model R_n^O with n dimensions:

$$R_n^O = \begin{bmatrix} N_O & c_1 & v_1 \\ & c_2 & v_2 \\ & \vdots & \vdots \\ & c_n & v_n \end{bmatrix} = \begin{bmatrix} N_O & c_1 & \left[v_{O1}^L, v_{O1}^R\right] \\ & c_2 & \left[v_{O2}^L, v_{O2}^R\right] \\ & \vdots & \vdots \\ & c_n & \left[v_{On}^L, v_{On}^R\right] \end{bmatrix}. \quad (3)$$

Where, $v_{Oj}^L = \min_{1\le i\le m}\left(v_j^L(i)\right), v_{Oj}^R = \max_{1\le i\le m}\left(v_j^R(i)\right)$. m refers to the number of development state or evaluation grade of sustainable development of sports tourism industry.

3.2.1 EXTENSION degree evaluation model of sustainable development of sports tourism industry

Suppose the matter-element model for evaluation is R_d:

$$R_d = \begin{bmatrix} N_d & c_{d1} & v_{d1} \\ & c_{d2} & v_{d2} \\ & \vdots & \vdots \\ & c_{dn} & v_{dn} \end{bmatrix} = \begin{bmatrix} N_d & c_{d1} & \left[v_{d1}^L, v_{d1}^L\right] \\ & c_{d2} & \left[v_{d2}^L, v_{d2}^L\right] \\ & \vdots & \vdots \\ & c_{dn} & \left[v_{dn}^L, v_{dn}^L\right] \end{bmatrix}. \quad (4)$$

To effectively calculate the extension degree between the matter-element model R_d and matter-element in classic field of different state or evaluation degree, this paper discusses the followings:

(1) If the characteristic value of a quantity of the matter-element model for evaluating R_d is a point value for qualitative description, then the extension distance $\rho\left(R_d^j \mid R_n^C(i)\right)$ between R_d and the matter-element model $R_n^C(i)$ about characteristics j is:

$$\rho\left(R_d^j \mid R_n^C(i)\right) = \left|v_{dj} - \frac{v_j^L(i)+v_j^R(i)}{2}\right| - \frac{v_j^R(i)-v_j^L(i)}{2}. \quad (5)$$

Similarly, the extension distance $\rho\left(R_d^j \mid R_n^O(i)\right)$ between R_d and the matter-element model $R_n^O(i)$ about characteristics j is:

$$\rho\left(R_d^j \mid R_n^O(i)\right) = \left|v_{dj} - \frac{v_{Oj}^L(i)+v_{Oj}^R(i)}{2}\right| - \frac{v_{Oj}^R(i)-v_{Oj}^L(i)}{2}. \quad (6)$$

(2) If the characteristic value of a quantity of the matter-element model for evaluating R_d is a fuzzy interval value of quantity and if the optimal value of a quantity of the matter-element in classic field is at the middle of the interval, then the extension distance $\rho\left(R_d^j \mid R_n^C(i)\right)$ between R_d and the matter-element model $R_n^C(i)$ about characteristic j is:

$$\rho\left(R_d^j \mid R_n^C(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^C(i)\right) + \rho\left(v_{dj}^R \mid R_n^C(i)\right)\right). \quad (7)$$

Substitute (1) to (7) and get:

$$\rho\left(R_d^j \mid R_n^C(i)\right) = \frac{1}{2}\left(\left|v_{dj}^L - \frac{v_j^L(i)+v_j^R(i)}{2}\right| - v_j^R(i) + v_j^L(i) + \left|v_{dj}^R - \frac{v_j^L(i)+v_j^R(i)}{2}\right|\right). \quad (8)$$

Similarly, the extension distance $\rho\left(R_d^j \mid R_n^O(i)\right)$ between R_d and the matter-element model $R_n^O(i)$ about characteristic j is:

$$\rho\left(R_d^j \mid R_n^O(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^O(i)\right) + \rho\left(v_{dj}^R \mid R_n^O(i)\right)\right). \quad (9)$$

Substitute (1) to (7) and get:

$$\rho\left(R_d^j \mid R_n^O(i)\right) = \frac{1}{2}\left(\left|v_{dj}^L - \frac{v_{Oj}^L(i)+v_{Oj}^R(i)}{2}\right| - v_{Oj}^R(i) + v_{Oj}^L(i) + \left|v_{dj}^R - \frac{v_{Oj}^L(i)+v_{Oj}^R(i)}{2}\right|\right). \quad (10)$$

(3) If the characteristic value of a quantity of the matter-element model for evaluation R_d is a fuzzy interval value of quantity and if the optimal value of a quantity of the matter-element in classic field is $v_j^0(i) \in \left[v_j^L(i), \frac{v_j^L(i)+v_j^R(i)}{2} \right]$, the extension distance $\rho\left(R_d^j \mid R_n^C(i)\right)$ between R_d and the matter-element model $R_n^C(i)$ about characteristic j is:

$$\begin{cases} \rho\left(R_d^j \mid R_n^C(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^C(i)\right) + \rho\left(v_{dj}^R \mid R_n^C(i)\right)\right) & \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = v_j^L(i) - v_{dj}^x & v_{dj}^x \le v_j^L(i) \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = v_{dj}^x - v_j^R(i) & v_{dj}^x \ge v_j^0(i) \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = (v_j^R(i) - v_j^0(i))(v_{dj}^x - v_j^L(i))/(v_j^L(i) - v_j^0(i)) & v_{dj}^x \in (v_j^L(i), v_j^0(i)) \end{cases} . \quad (11)$$

If the optimal value of a quantity of matter-element in classic field is $v_j^0(i) \in \left[\frac{v_j^L(i)+v_j^R(i)}{2}, v_j^R(i) \right]$, the extension distance $\rho\left(R_d^j \mid R_n^C(i)\right)$ between R_d and the matter-element model $R_n^C(i)$ about characteristic j is:

$$\begin{cases} \rho\left(R_d^j \mid R_n^C(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^C(i)\right) + \rho\left(v_{dj}^R \mid R_n^C(i)\right)\right) & \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = v_j^L(i) - v_{dj}^x & v_{dj}^x \le v_j^0(i) \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = v_{dj}^x - v_j^R(i) & v_{dj}^x \ge v_j^R(i) \\ \rho\left(v_{dj}^x \mid R_n^C(i)\right) = (v_j^L(i) - v_j^0(i))(v_j^R(i) - v_{dj}^x)/(v_j^R(i) - v_j^0(i)) & v_{dj}^x \in (v_j^0(i), v_j^R(i)) \end{cases} . \quad (12)$$

Similarly, the extension distance $\rho\left(R_d^j \mid R_n^O(i)\right)$ between R_d and the matter-element model $R_n^O(i)$ about characteristics j has two forms. If there is $v_j^0(i) \in \left[v_{Oj}^L(i), \frac{v_{Oj}^L(i)+v_{Oj}^R(i)}{2} \right]$, then:

$$\begin{cases} \rho\left(R_d^j \mid R_n^O(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^O(i)\right) + \rho\left(v_{dj}^R \mid R_n^O(i)\right)\right) & \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = v_{Oj}^L(i) - v_{dj}^x & v_{dj}^x \le v_{Oj}^L(i) \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = v_{dj}^x - v_{Oj}^R(i) & v_{dj}^x \ge v_j^0(i) \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = (v_{Oj}^R(i) - v_j^0(i))(v_{dj}^x - v_{Oj}^L(i))/(v_{Oj}^L(i) - v_j^0(i)) & v_{dj}^x \in (v_{Oj}^L(i), v_j^0(i)) \end{cases} . \quad (13)$$

If there is $v_j^0(i) \in \left[\frac{v_{Oj}^L(i)+v_{Oj}^R(i)}{2}, v_{Oj}^R(i) \right]$, then:

$$\begin{cases} \rho\left(R_d^j \mid R_n^O(i)\right) = \frac{1}{2}\left(\rho\left(v_{dj}^L \mid R_n^O(i)\right) + \rho\left(v_{dj}^R \mid R_n^O(i)\right)\right) & \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = v_{Oj}^L(i) - v_{dj}^x & v_{dj}^x \le v_j^0(i) \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = v_{dj}^x - v_{Oj}^R(i) & v_{dj}^x \ge v_{Oj}^R(i) \\ \rho\left(v_{dj}^x \mid R_n^O(i)\right) = (v_{Oj}^L(i) - v_j^0(i))(v_{Oj}^R(i) - v_{dj}^x)/(v_{Oj}^R(i) - v_j^0(i)) & v_{dj}^x \in (v_j^0(i), v_{Oj}^R(i)) \end{cases} . \quad (14)$$

Thus, we can get the extension degree $K\left(R_d^j \mid R_n^C(i)\right)$ between R_d and the matter-element model $R_n^C(i)$ about characteristics j :

$$K\left(R_d^j \mid R_n^C(i)\right)=\begin{cases} -\dfrac{\rho\left(R_d^j \mid R_n^C(i)\right)}{\left|v_j(i)\right|} & \left[v_{dj}^L, v_{dj}^R\right] \in \left[v_j^L(i), v_j^R(i)\right] \\ \dfrac{\rho\left(R_d^j \mid R_n^C(i)\right)}{\rho\left(R_d^j \mid R_n^O(i)\right)-\rho\left(R_d^j \mid R_n^C(i)\right)} & \left[v_{dj}^L, v_{dj}^R\right] \notin \left[v_j^L(i), v_j^R(i)\right] \end{cases}. \tag{15}$$

If weight of the matter-element characteristic is considered, the weighted extension degree $\phi\left(R_d \mid R_n^C(i)\right)$ is:

$$\phi\left(R_d \mid R_n^C(i)\right)=\sum_{j=1}^{n}\left(w_j * K\left(R_d^j \mid R_n^C(i)\right)\right). \tag{16}$$

Normalize the weighted extension degree $\phi\left(R_d \mid R_n^C(i)\right)$ and get:

$$\bar{\phi}\left(R_d \mid R_n^C(i)\right)=\frac{\phi\left(R_d \mid R_n^C(i)\right)-\min\limits_{1\le i\le m}\phi\left(R_d \mid R_n^C(i)\right)}{\max\limits_{1\le i\le m}\phi\left(R_d \mid R_n^C(i)\right)-\min\limits_{1\le i\le m}\phi\left(R_d \mid R_n^C(i)\right)}. \tag{17}$$

If there is

$$\bar{\phi}\left(R_d \mid R_n^C(k)\right)=\max\left(\bar{\phi}\left(R_d \mid R_n^C(1)\right),\bar{\phi}\left(R_d \mid R_n^C(2)\right),\cdots,\bar{\phi}\left(R_d \mid R_n^C(m)\right)\right). \tag{18}$$

Then it indicates that the evaluation grade of sustainable development of sports tourism industry is of grade k **.**

4 Case study and test

This paper intends to combine forest areas' geographical features and regional advantage to do the analysis of the sustainable development assessment of sports tourism industry. And based on the above to do the verification and instructions for models and algorithms. The forest yard, their geographic environment is superior, the river in the forest area of diverse, both gentle rapids of the river there are rapids, relatively abundant rainfall in summer, while winter snow sources are abundant, therefore, based on the existing strengths suited to carry out forest skiing and rafting sports tourism projects. To this end, by seeking expert advice on the basis of the forest to carry out skiing, rafting and other sports tourism industry sustainability assessment into force excellent, good, fair, poor four levels, namely the force corresponding to the four sustainability assessment Classic domain matter element, the specific results is as shown in Table 2

TABLE 2 Analysis on evaluation of sustainable development of forest sports tourism industry

indicator layer	Characteristics value of quantity of matter-element				
	Classic field I	**Classic field II**	**Classic field III**	**Classic field IV**	**Indicator value**
upgrading of regional social force a_{11}	0-0.20	0.20-0.40	0.40-0.70	0.70-1.0	0.50
government support a_{12}	0-0.20	0.20-0.50	0.50-0.80	0.80-1.0	0.60
tourist satisfaction a_{13}	0-0.20	0.20-0.50	0.50-0.80	0.80-1.0	0.70-0.80
public support a_{14}	0-0.20	0.20-0.50	0.50-0.80	0.80-1.0	0.60-0.70
sustainable development of related industries a_{15}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.30
input cost a_{21}	80-100	60-80	40-60	0-40	80
investment returns a_{22}	0-0.10	0.10-0.30	0.30-0.60	0.60-1.0	0.30
market growth a_{23}	0-0.10	0.10-0.30	0.30-0.60	0.60-1.0	0.20
sustainable industry scale a_{24}	0-20	20-40	40-60	60-100	40
ecological environment protection a_{31}	0-0.60	0.60-0.80	0.80-0.90	0.90-1.0	0.80

influence on residents a_{32}	0-0.10	0.10-0.30	0.30-0.60	0.60-1.0	0.40-0.50
sustainable environment protection efforts a_{33}	0-0.40	0.40-0.60	0.60-0.80	0.80-1.0	0.80
green life a_{41}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.60-0.80
sports event brand a_{42}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.80
sports event appeal a_{43}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.60
sports event competitiveness a_{44}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.60
low-carbon tourism a_{51}	0-0.10	0.10-0.30	0.30-0.60	0.60-1.0	0.80
tourism event brand a_{52}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.40
tourism event appeal a_{53}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.60
tourism event competitiveness a_{54}	0-0.20	0.20-0.40	0.40-0.60	0.60-1.0	0.60

According to the proposed model and algorithm, we can get the extension distance and extension degree of forest sports tourism, such as skiing, rafting, as are shown in Table 3 and Table 4.

TABLE 3 Extension distance of sustainable development of forest sports tourism industry

Indicator layer	Classic field I	Classic field II	Classic field III	Classic field IV	Section field
upgrading of regional social force a_{11}	0.30	0.10	-0.10	0.20	-0.50
government support a_{12}	0.40	0.10	-0.10	0.20	-0.40
tourist satisfaction a_{13}	0.55	0.25	-0.015	0.05	-0.25
public support a_{14}	0.45	0.15	-0.10	0.15	-0.35
sustainable development of related industries a_{15}	0.10	-0.10	0.10	0.30	-0.30
input cost a_{21}	0	0	20	40	-20
investment returns a_{22}	0.20	0	0	0.30	-0.30
market growth a_{23}	0.10	-0.10	0.10	0.40	-0.20
sustainable industry scale a_{24}	20	0	0	20	-40
ecological environment protection a_{31}	0.20	0	0	0.10	-0.20
influence on residents a_{32}	0.35	0.15	-0.10	0.15	-0.45
sustainable environment protection efforts a_{33}	0.40	0.20	0	0	-0.20
green life a_{41}	0.50	0.25	0.10	-0.10	-0.30
sports event brand a_{42}	0.60	0.40	0.20	-0.20	-0.20
sports event appeal a_{43}	0.40	0.20	0	0	-0.40
sports event competitiveness a_{44}	0.40	0.20	0	0	-0.40
low-carbon tourism a_{51}	0.70	0.50	0.20	-0.20	-0.20
tourism event brand a_{52}	0.20	0	0	0.20	-0.40
tourism event appeal a_{53}	0.40	0.20	0	0	-0.40
tourism event competitiveness a_{54}	0.40	0.20	0	0	-0.40

TABLE 4 Extension degree of sustainable development of forest sports tourism industry

indicator layer	Classic field I	Classic field II	Classic field III	Classic field IV
upgrading of regional social force a_{11}	-0.375	-0.167	0.333	-0.286
government support a_{12}	-0.50	-0.20	-0.10	-0.333
tourist satisfaction a_{13}	-0.688	-0.50	0.168	-0.20
public support a_{14}	-0.563	-0.300	0.333	-0.300
sustainable development of related industries a_{15}	-0.25	0.50	-0.25	-0.50
input cost a_{21}	0	0	-0.50	-0.667
investment returns a_{22}	-0.40	0	0	-0.50
market growth a_{23}	-0.333	0.50	-0.333	-0.667
sustainable industry scale a_{24}	-0.333	0	0	-0.333
ecological environment protection a_{31}	-0.50	0	0	-0.334
influence on residents a_{32}	-0.438	0.25	0.337	0.25
sustainable environment protection efforts a_{33}	-0.667	-0.50	0	0
green life a_{41}	-0.625	-0.455	-0.25	0.25
sports event brand a_{42}	-0.75	-0.667	-0.50	0.50
sports event appeal a_{43}	-0.50	-0.333	0	0
sports event competitiveness a_{44}	-0.50	-0.333	0	0
low-carbon tourism a_{51}	-0.778	-0.714	-0.50	0.50
tourism event brand a_{52}	-0.333	0	0	-0.333
tourism event appeal a_{53}	-0.50	-0.333	0	0
tourism event competitiveness a_{54}	-0.50	-0.333	0	0

Weigh the extension degree of each indicator and get the membership degree sequence between ability to achieve sustainable development of forest sports tourism, such as skiing, rafting, and every classic field. The conclusion reached is that the forest region is in a good state of sustainable development.

5 Conclusions

This paper proposes an evaluation model of sustainable development based on matter-element theory. An indicator system is put in place. Evaluation indicators of classical field matter-element model, section domain matter-element model are constructed to calculate the extension distance and the extension degree between different evaluation indicators and matter-element in classic field. The grade of the sports tourism industry is known. This paper provides a solution to optimize the sports tourism industry. Case study has proved that the model and the algorithm are effective.

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