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LETTER TO THE EDITOR

The Impact of Oil-to-Electricity Conversion on Eco-Environmental Protection in Logistics Transportation

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Taking the integrated transportation system and the ecological environment system as the research objects, the paper calculates the game power, the game resultant force and the game dominance degree by using the method of game identification, and analyses the dominance and key factors of the integrated transportation system and the ecological environment system in realizing the sustainable comprehensive transportation development. The results show that the ecological environment system plays a dominant role in the game identification of the two systems, which provides a scientific basis for decision-making for the future development of integrated transportation.
Integrated Transportation System; Eco-environmental System; Game Identification; Grey Relational Analysis.

1 INTRODUCTION

In recent years, the continuous development of integrated transportation system to a certain extent meets the social and economic needs, but at the same time, the interaction between integrated transportation system and ecological environment system is also increasing, causing some environmental problems. In order to achieve the goal of sustainable development of integrated transportation system and ecological environment system, it is necessary to analyze the relationship between integrated transportation system and ecological environment system (Bandara and Wu 2018, Mousa and Dong 2018, Deng et al. 2018).

Junli Zhang, Long Zhang, Edwin C. et al. published an article in the Journal of Ekoloji (Issue 107, 2019) entitled "Evaluation on Ecologically Sustainable Development on Liaohe Oil Field", which is proposed for petroleum eco-environment. The countermeasures for the sustainable development of oilfield ecology have led to an increase in energy demand and an ever-increasing oil price, further affecting the world's energy distribution network. For China, the ecological sustainability of energy supply security and development is an important issue. Liaohe Oilfield in China is a comprehensive state-owned enterprise mainly engaged in oil and gas exploration. It is considered as the third largest oil field in China and the main supplier of heavy oil, super heavy oil and high pour point oil in China. However, its ecological sustainable development is constrained by energy shortage, redundancy of workers and high labor costs. Taking Liaohe Oilfield as an example, the evaluation index system is established by using harmonious development theory, sustainable development theory and general system theory. But this method is more effective (Anastasiou and Buchbauer 2017, Raza et al. 2017, Baj et al. 2017).

Literature establishes an evaluation method for the ecological environment damage of oil and gas development projects, and uses a small number of indicators to rapidly evaluate the main ecological environment damage of oil

and gas development projects throughout the life cycle. By collecting and analyzing the field survey data of Weizhou Sea area from 2002 to 2015, the relationship between oil and gas development and ecological environment change is analyzed, and the main influencing factors of oil and gas development on the ecological environment are screened. Under the framework of force-state-response, an ecological damage assessment model is constructed to evaluate the ecological damage of production water discharged from oil and gas development. The conventional conclusion that production water affects the ecological environment within 500 m of the sewage outlet is verified. At the same time, it is found that the influence range of production water extends to the sea area within 1000m of the sewage outlet with seasonal variation. The algorithm of this model is simple and fast, and it can be used for marine life. Eco-environmental protection policy provides the basis for calculation, but the effect of this method is better. Literature puts forward the impact analysis of environmental protection fee to tax on China's ecological environment and economic development, which has a series of impacts on China's ecological environment, including: air pollution will be reduced, solid waste treatment will be further standardized, sewage treatment will be gradually industrialized, and large decibel noise will be effectively suppressed. The impact on the economy is that at first it may reduce the speed of development to a certain extent, but in the long run it will help to optimize the economic structure and maintain the sustainability of development. From a pragmatic point of view, whether the ecological environment can be fundamentally improved depends on three aspects: (1) whether the law can be strictly enforced; (2) whether the measurement of pollution equivalent is scientific and effective; (3) whether the local government can achieve better environmental protection than economic growth in decision-making. In view of the above problems, this paper proposes a study on the impact of oil-to-electricity conversion on the ecological environment in logistics transportation.

2 IDEA DESCRIPTION

The comprehensive transportation system is an important part of the national economy and a necessary condition for people to travel and all social activities. Eco-environmental system refers to the total number and quality of water resources, land resources, biological resources and climate resources affecting human survival and development. It is a complex open system related to the sustainable development of society and economy. Eco-transportation refers to the transportation system that is planned, constructed and managed according to the ecological principle, with low consumption of resources and energy, less pollution and emission, and coordinated with the environment. The development of integrated transportation needs to occupy land, consume a large number of natural resources, and produce pollution environment such as exhaust gas and noise. Its development will have a negative impact on resources and environment. With the proposal of national sustainable development strategy, the development of ecological transport is imminent. Based on this, we must follow the principle of sustainable development, make the development of comprehensive transport adapt to the ecological environment, and establish an ecological comprehensive transport system. Based on this, this paper uses game identification method to analyze the interaction between integrated transportation system and ecological environment system. The method defines the following concepts:

(1) Force(‘f): refers to the ability of a factor in an integrated transportation system or an ecological environment system to change with the change of another factor in another system.

(2) Game force(f): refers to the ability of one factor in an integrated transportation system or an ecological environment system to change the state of another system.

(3) Resultant game force (F): refers to the ability of a comprehensive transport system or any system of ecological environment to change the state of another system.

(4) Game dominance (D): refers to the relative capacity of integrated transportation system and ecological environment system to influence ecological transportation in the game process.

Based on the analysis of the above analysis steps, the extraction of large incremental data of ecological environment has been completed.

3 RESULTS

To determine the index system and weight of each system, establish the index system that affects the comprehensive transportation system and the ecological environment system, and determine the internal factors and weights of the index system, as shown in Figure 1.

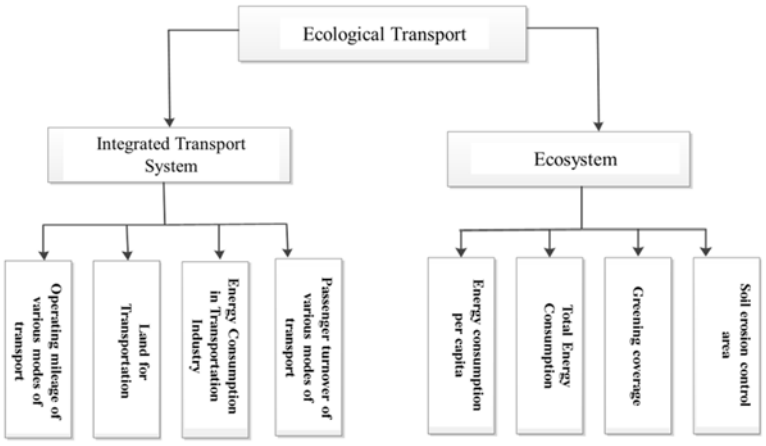

Fig. 1 Eco-transport index system

The grey relational analysis method can express the relativity between the factors of the two systems through the quantitative comparative analysis of the development situation of the dynamic process of the grey system. In this paper, the grey relational analysis method is used to calculate the influence of one factor in one system on one factor in another system. The specific steps are as follows:

(1) Determine the reference sequence and comparison sequence, and initial value processing. If the index system of integrated transportation system is T and the ecological environment system is B, then the factors of the index system of integrated transportation system and the ecological environment system are T_i and B_j, among which $i = 1, 2, 3, ...n$ and $j = 1, 2, 3, ...n$.

(2) Calculating grey correlation coefficient and grey correlation degree;

(3) Calculate f. From the second deduction, we get the value of all single factor f_i, which is determined by the sum of the influence of the factor on all factors in another system, namely $f = \sum_{i=1}^{n} a_i f_i$. Among them, a_i is the weight of factor i in the relevant system, and f_i is the influence of the evaluation factor on the factors in the relevant system. If the game power of a factor i influencing the integrated transportation system to the

ecological environment system is $f(t)_i$, then $f(t)_i = \sum_{j=1}^{m} \beta_i \times f'(t)_{i \to j}$; if the game power of a factor j influencing the ecological environment system to the integrated transportation system is $f(b)_j$, then $f(t)_i = \sum_{j=1}^{m} \beta_i \times f'(t)_{i \to j}$.

(4) Computing the resultant strength and dominance of the game. The F of the influence of the A system on the B system is equal to the sum of the weighted game forces of the factors of the A system on the B system. The game synergy of integrated transportation system to ecological environment system is $F(t) = \sum_{i=j}^{n} a_i f(t)_i$. Correspondingly, the game synergy of the ecosystem to the integrated transportation system is $F(b) = \sum_{j=1}^{m} \beta f(b)_j$, and the game dominance of one system over another is equal in quantity to the ratio of the game synergy of the system to the game synergy of another system. The game advantage degree of the integrated transportation system relative to the ecological environment system is $D(t) = F(t) / F(b)$, and the game advantage degree of the ecological environment system equivalent to the integrated transportation system is:

$$D(b) = \frac{F(b)}{F(t)}$$

Game dominance can reflect the dominance of the system in maintaining coordination among systems. If D > 1, it means that the system is dominant and dominant in the game with another system, and vice versa, it is passive.

The oil data algorithm proposed by Junli Zhang et al. is a better data extraction method in the existing research, and has obtained good research results. The data extraction accuracy of the proposed algorithm is compared with that of Junli Zhang et al.

In the process of extracting large data from ecological environment, with the increase of the amount of data, the accuracy of data extraction presents a fast-upward trend. The accuracy of extracting environmental data from ecological environment in this algorithm increases rapidly. The accuracy of data extraction proposed by Junli Zhang and others shows a slow upward trend, and then the accuracy of data extraction tends to be stable. The accuracy of data extraction of this method is about 90%, which is obviously higher than the algorithm proposed by Junli Zhang et al. It can be clearly seen that this algorithm has good performance and can accurately extract large ecological environment data.

In order to further verify the eco-environmental performance of this paper, the data extraction efficiency of this algorithm is compared with that of Junli Zhang's algorithm under the condition of constantly changing data increment. The test results show that with the constant change of data increment, the extraction efficiency of Junli Zhang's algorithm fluctuates greatly, and the extraction efficiency is low, while the stability of this algorithm is better and the extraction efficiency is higher.

4 DISCUSSION

According to the development of China's integrated transportation system and the statistical data from 2000 to 2008, this paper uses the translation method to record every four years as a period (five periods). The game identification relationship between the integrated transportation system and the ecological environment system is analyzed.

(1) Calculation of influence

The grey relational degree analysis is used to calculate the influence force, and the grey relational degree is the value of the influence force. Taking the elements in the integrated transportation system as the reference sequence and the elements in the ecological environment system as the comparison sequence, the grey correlation degree of the factors in the integrated transportation system and the ecological environment system can be obtained. Taking the elements of the ecological environment system as the reference sequence and the elements of the comprehensive transportation system as the comparison sequence, the grey correlation degree of the factors of the ecological environment system and the comprehensive transportation system can be obtained.

(2) Calculation of game power

On the basis of using grey relational degree to determine the influence, the game power of one factor in the integrated transportation system and the ecological environment system can be calculated for another system. From this, we can get the game power of the ecological environment system to the integrated transportation system and the game power of the integrated transportation system to the ecological environment system in each period.

(3) Game synergy and game dominance

According to the result of the calculation of the game power and the formula of the game resultant force, the game resultant force of the ecological environment system B to the comprehensive transportation system T and the game resultant force of the comprehensive transportation system T to the ecological environment system B can be obtained.

(4) Analysis of results

By analyzing the game superiority of the integrated transportation system and the ecological environment system, we can see that the ecological environment system is always in the leading position in the process of interaction between the integrated transportation system and the ecological environment system. This shows that the development of integrated transportation is always restricted by the ecological environment system, and the calculation results show that this restriction trend will become increasingly obvious. This result shows that in the construction of integrated transportation system, China attaches importance to the coordinated development of ecological environment system and achieves the sustainable development of integrated transportation system. With the development of society, the impact of integrated transportation system on the ecological environment system will remain relatively stable. Therefore, in order to save energy and reduce waste of resources, it is necessary to vigorously develop ecological transportation.

In the process of the impact of integrated transportation system on the ecological environment system, through the analysis of the game power of integrated transportation system on the ecological environment system in different periods, it can be seen that the railway has the characteristics of large traffic volume, high transport capacity, energy saving and little impact on the ecological environment, so it has a greater impact than other modes of transportation. From this, we can see that different modes of transportation have different impacts on the ecological environment system. Therefore, the reasonable adjustment of the structure of integrated transportation system can better realize the ecological transportation.

5 CONCLUSIONS

This paper identifies the relationship between the integrated transportation system and the ecological environment system on the basis of the relevant research, and discusses the influence of different factors in the two systems on the stability of the other system through examples. This discussion provides a basis for the development of ecological transportation decision-making. However, due to the limitation of objective conditions, there are not many factors that affect the identification of integrated transportation system and ecological environment system. There may be other factors that affect the stability of the system. Moreover, the different occupancies of various transportation modes in the integrated transportation system have different impacts on the ecological environment system, which need to be further studied.

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