Global NEST Journal, Vol 25, No 4, pp 77-85

The influence of ecological environment protection mechanism on the economic development and management mechanism of rural enterprises

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Received: 11/12/2022, Accepted: 13/01/2023, Available online: 16/01/2023
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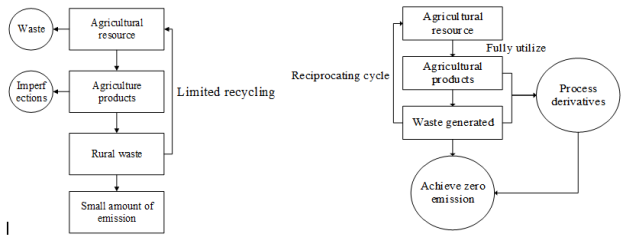
https://doi.org/10.30955/gnj.004637

Graphical abstract



Abstract:

The purpose is to analyze the economic development and management mechanism of rural enterprises, and explore the role of ecological environment protection mechanism in the economic development of rural enterprises. First, the related theories are analyzed and expounded; then, the participants of rural enterprise economy are analyzed, and the evaluation index system of rural enterprise economy is established. The economic and management mechanism of rural enterprises under the ecological environment protection mechanism is analyzed by using the model projection pursuit evaluation model under the real coded accelerated genetic algorithm. The results show that the ecological index coefficients are 0.0856, 0.1334, 0.1977, 0.2123 and 0.2543 respectively. In addition, the ecological economic index are 0.1932, 0.2168, 0.2693, 0.2168 and 0.1933. Irrigation level, effective control of soil erosion rate and forest coverage exert a significant impact on the economic development and management mechanism of rural enterprises; the small per capita water resources index indicates that it is essential to improve the water cycle; the occurrence rate of agricultural natural disasters exerts little influence on the development of agricultural circular economy, indicating that the ability of agriculture to resist natural disasters still needs to be improved. To sum up, this exploration can provide reference for the sustainable development of rural enterprise economy.

Keywords. Ecological environment protection mechanism, rural enterprise economy, circular economy, evaluation index, development mechanism, management mechanism

1. Introduction

With the development of rural ecological environment protection mechanism, it is essential to deepen the reform of rural environmental management system and mechanism, build a long-term mechanism of new rural ecological environment protection, and promote the rapid, stable and sustainable development of rural economy and society. One way to lessen poverty, migration, unemployment, and to enhance rural areas is through rural entrepreneurship. By providing employment opportunities to villagers, rural entrepreneurs can raise the standard of living and purchasing power of rural residents and those at the bottom of the food chain. Rural areas must develop through the use of education, entrepreneurship, physical infrastructure, and social infrastructure. The emphasis on locally developed economic development techniques that characterizes rural development. The development of any enterprise economy is the result of continuous innovation, and each innovation means the replacement of its mechanism (Lin and Xia, 2021). The enterprises in rural economic development not only necessary to explore the positive factors that can be activated in theory to promote the optimization of the mechanism, but also to find the main participants of the mechanism in practice to develop the agricultural circular economy, including the government, enterprises, farmers and agricultural-related social public (Feng *et al.*, 2021). Thereby, the development of enterprise economic theory, circular economy and sustainable development theory, the establishment of management mechanism, research and development of the circular economy has become a crucial research direction and circular economy. Due to the close relationship between agriculture and circular economy, the circular economy of rural enterprises is an important way to achieve sustainable development of agriculture

and improve the overall efficiency of agriculture (Wang *et al.*, 2018).

Based on this, a systematic study on the economic development of rural enterprises under the mechanism of ecological environment protection is conducted through a combination of qualitative and quantitative research methods, and the impact of the ecological environment on the management mechanism of rural enterprises is briefly discussed. The research innovation is to combine with the research of related theory, and use algorithm combined with projection pursuit evaluation model. By utilising its technology to lower the evaluation dimension of multi-factor changes and avoid the trap of high-dimensional phenomena, the projection pursuit technique may effectively address the issue of numerous calculations. This exploration aims to provide some reference for the sustainable development of the rural enterprise economy.

2. Theoretical summary of economic development and management mechanism of rural enterprises under the mechanism of ecological environment protection

2.1. Ecological environment protection mechanism

The ecological environment protection mechanism is a crucial means to achieve ecological stability, which plays an essential role in improving the quality of the rural ecological environment and promoting the development of rural enterprises (Niu and Xiao, 2021). The state should, as soon as possible, strictly control the development scale and development mode of ecologically fragile rural areas and ecological function protection areas, and protect the environment. It can be considered to levy environmental protection tax in this area, which is only limited to resource development or pollution enterprises, an appropriate proportion of the tax can be used for rural environmental protection and restoration, and the rest is evenly distributed by the central government (Xiang *et al.*, 2019; Liu *et al.*, 2022). The state charges local existing environmental pollution and cultivated land use in the legal form of environmental protection tax. Meanwhile, the state expands tax incentives for projects that are conducive to the protection and treatment of the ecological environment in villages and towns and the restoration of the ecological environment, encourages the development of projects such as ecological environment treatment, comprehensive utilization of resources, pollution control, and comprehensive development of rural enterprises, and cancels the policies and regulations that are not conducive to ecological protection (Xu, 2021). Moreover, the state may resolutely stop the investment projects that damage the ecological environment through administrative means. For some losses, the waste recycling industry and the waste safety treatment industry, financial incentives and government subsidy policies can be adopted to make them achieve the average social benefits (Bilal *et al.*, 2018).

2.2. Circular economy of rural enterprises

The circular economy of rural enterprises is a new economic model of rural enterprises developed under the guidance of circular economy concept and sustainable development concept (Nie *et al.*, 2020). A resource utilisation system is used in a circular economy to reduce the production of resources as much as feasible. If we take into consideration the reuse of those materials that cannot be recycled, this would be accomplished. Sustainable development and circular economy act on the agricultural production system. It conforms to the law of material circulation and energy flow in ecosystem, including correctly reducing input and waste in agricultural production and life cycle. The circulation of agricultural products makes the material circulation coexist harmoniously in the economic system and ecological systems. The recycling of agricultural resources is conducted and economic and ecological benefits are coordinated. The agricultural circular economy is fundamentally an ecological economy (Lesnykh, 2021). Based on the principle of the economic cycle and characterized by low consumption, low emission and high utilization, the mode of agricultural operation and consumption of agricultural products should be changed to achieve a win-win situation between the economy of rural enterprises and the ecological environment. This exploration holds that the concept of rural enterprise economy refers to the application of the idea of circular economy in the agricultural production and management system. It takes reduction, reuse and recycling as the principle, takes comprehensive economic and social and ecological benefits as the characteristics, takes efficient utilization and resources waste reduction as the goal to reduce the resource and material input in the agricultural production process and the life cycle of agricultural products (Yuan and Nie, 2018). Production and waste emissions are reduced to achieve a win-win economic form of the agricultural economy (A), social benefits (B), ecological environment (C) and Sustainability (D). Figure 1 displays its hierarchical structure.

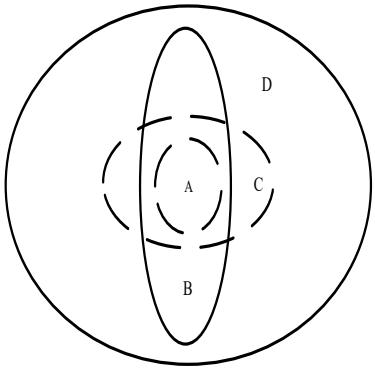


Figure 1. Hierarchical structure of rural enterprise economic system

Figures 2 and 3 present the economic operation chart of traditional agriculture and rural enterprises based on ecological environment protection mechanisms.

The comparison of traditional and modern pattern of rural enterprises shows that the development of rural enterprises in the circular economy is not only diversified. Improving agricultural production, ensuring product quality and economic benefits, and promoting social progress, environmental protection and resource

coordination are the development priorities of rural enterprises, especially on improving the ecological and social benefits of rural enterprises, with economic benefits as the goal and ecological benefits as the guarantee. The social advantage is the extension of economic advantage. The ecological benefit without economic benefit is not based on existence, and the economic benefit without ecological benefit is unsustainable. Therefore, it is essential to speed up the rational distribution of rural natural resources. Rural enterprises should make full use of labor resources, adjust the rural economic structure, and realize the specialization and circulation of rural production. The production of rural enterprises should be actively guided to gradually accept the adjustment of the market mechanism, and it is essential to promise to guarantee the economic development role of rural enterprises.

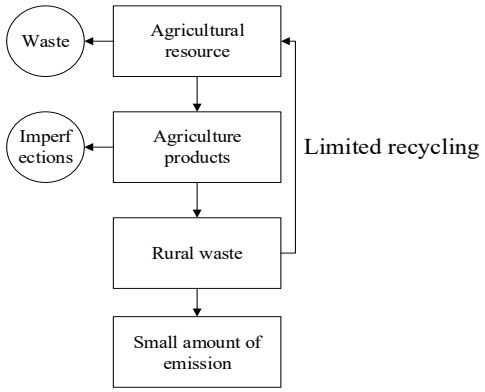


Figure 2. Economic cycle pattern of traditional rural enterprises

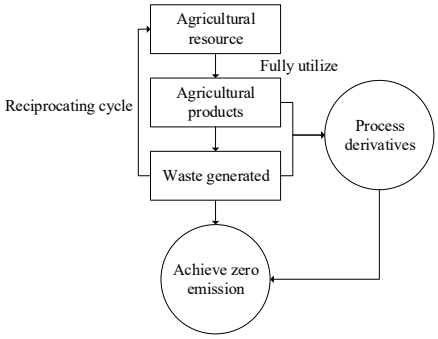


Figure 3. Economic cycle pattern of modern rural enterprises

2.3. Ecological characteristics of circular economy in rural enterprises

The agricultural circular economy is an ecological transformation of extensive and input-intensive agricultural economic growth mode (Wei *et al.*, 2021). First, from the perspective of resources and the environment, the basic goal of an agricultural circular economy is to save resources as much as possible in all agricultural production and operation links, and avoid and reduce the generation of agricultural waste (Li, 2020). Agricultural renewable high-tech is employed for agricultural production and management, and the closed-loop mode of "agricultural products, agricultural waste, agricultural cascade renewable resources industry" is followed to optimize the agricultural system structure and maximize the use of agricultural resources (Gao *et al.*, 2019). Agricultural circular economy expands the space for agricultural development, and expands the industrial chain and resource utilization chain of the agricultural economy. Hence, the key to the development of the agricultural circular economy is to solve and control the whole process of resource use and reuse, and reduce the deteriorating environment. Second, environmental protection. The agricultural circular economy focuses more on the source of social production. In the whole social and economic system, agricultural circular economy not only focuses on environmental problems, but also is a part of green national economic production (Maulana and Pratama, 2021). At present, efforts must be made to protect the economic utilization of agricultural resources, improve the agricultural production environment, protect farmland biodiversity, and strengthen the purification of soil, cultivated land and water resources. In order to develop an agricultural economy, agricultural resources must be used rationally to reduce the quantity of use; the balance of cultivated land quality and quantity, and the basis of sustainable utilization of water resources should be focused, so as to develop an agricultural economy. Moreover, it is regarded as the basis of sustainable agricultural development and stability (Sidhu, 2018). Improving the ecological environment is a crucial goal of the development of an agricultural circular economy and the most significant symbol of social development.

2.4. Management mechanism of rural enterprises

The rural enterprise economy under the mechanism of ecological environment protection is a form of agricultural circular economy based on ecological agriculture. In essence, as a subsystem of circular economy, the agricultural circular economy must also be a subsystem composed of economic, social, ecological and technological factors, which is a new development model (Chen, 2019). The operation and development of the system must be supported by appropriate management and operation mechanism (Mtisi, 2020). From the perspective of the government, farmers, enterprises, the public and other stakeholders, it is essential to establish a sound management mechanism to develop a rural circular economy. Figures 4 and 5 displays the specific structure.

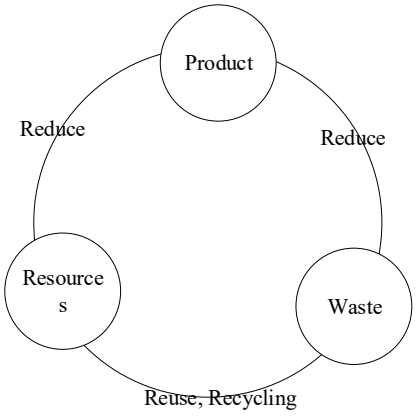


Figure 4. Operation mode of circular economy of rural enterprises based on ecological environment protection mechanism

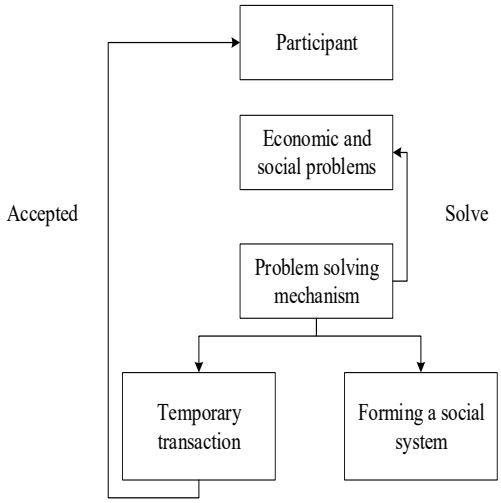


Figure 5. Management mechanism of rural enterprises

The concept of people-oriented development has been established, and the core of social development is human development itself. The attention to human beings must meet the needs of human. Any development without considering the sustainable development of human beings is a wrong position; this is why American economists believe that the core issue of development is position; the ultimate goal of development is to make R&D possible, enter the global development and R&D position, and provide more and more opportunities to improve life for all. Sustainable development is people's reflection on unsustainable behavior in the process of development. Through the gradual analysis of the concept of development, people fully realize that development should be a process of gradual expansion of internal regulations from point to surface, from individual to system, from plane to space, from static to dynamic (Wang *et al.*, 2019).

3. The impact of ecological environment protection mechanism on the economic development of rural enterprises

3.1. Participants of circular economy development mechanism of rural enterprises

Participants such as households, firms and government, national experts and scholars have different views on the agricultural circular economy, that is, local governments and enterprises, as well as the public and farmers, have different opinions. However, the current practice of agricultural circular economy development in China is still dominated by the government, while farmers, consumers and enterprises passively participate in the form of public and non-governmental organizations to develop agricultural circular economy, which has a great resistance (Mihály, 2019). According to the theory of economics and circular economy, the government expects that the development trend of agricultural circular economy is the best behavior that enterprises choose voluntarily. However, it is known that there is an essential difference between "necessary choice" (i.e. assigning responsibilities) and "positive choice" (i.e. contracting). Different degrees of the willingness of the main body indicates that the non-governmental organizations of agricultural enterprises, farmers, consumers and the public cannot take the lead in realizing some form of economy, and cannot provide a more reasonable income and intervention of unreasonable development mechanism (Huang, 2019). Therefore, from the perspective of theoretical research and serving practice, it is essential to deeply study the specific performance of participants and understand the contradiction between agricultural circular economy, that is, the contradiction between the behavior of the best participants and agriculture in the whole macroeconomic system (Yeshchenko *et al.*, 2020). Figure 6 presents the framework design of the economic development mechanism of rural enterprises based on the ecological environment protection mechanism.

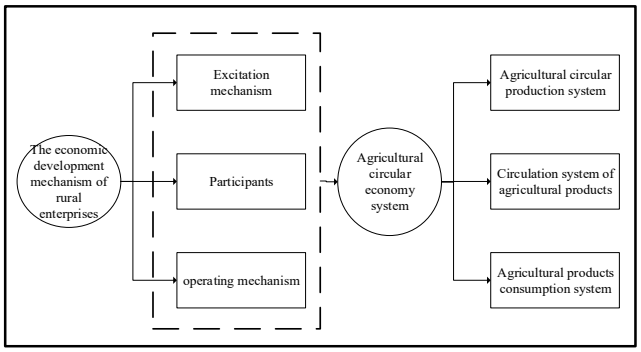


Figure 6. The framework design of rural enterprise economic development under the ecological environment protection mechanism

3.2. Identification of participants and their relationship

Each participant of agricultural circular economy is an independent subject, but it does not represent a sense of isolation. They interact with each other. Figure 7 displays the specific situation.

As the participants of rural enterprise economy, the relationship among farmers, government, enterprises, consumers and non-governmental organizations is closer. Non-governmental organisations play a key role in mobilising local resources for rural development. The complex relationship between these two, among three or even more themes must be carefully defined (Luca, 2018). Figure 8 shows the relationship among micro participants, in which 1, 2, 3 and 4 represent the four micro organizations of agricultural circular economy respectively. The letters of each box represent a microorganism participating in the agricultural circular economy, and the double arrow lines between the themes represent the economic links between them. Obviously, the subject relationship increases in multiple with the increase of the number of micro organizations.

However, in order to capture the number of relationships more accurately, the analysis shows that the relationship among participants increases as arithmetic multiple with the increase of the number of participants (Arifin *et al.*, 2020). The mathematical expression is as follows.

$$AP_n = C_n^m = \frac{n!}{m!(n-m)!} \quad (1)$$

n is the number of micro participants. *m* is the number of micro participants in an economic relationship. In the relationship equation, the minimum number of micro participants constituting an economic relationship is a given number. Therefore, the equation can be simplified as:

$$AP_n = \frac{n(n-1)}{2} \quad (2)$$

Through the calculation, it can be obtained that the number of economic relations of micro participants is, the number of economic relations of micro participants is, the economic relations of micro participants is, and so on.

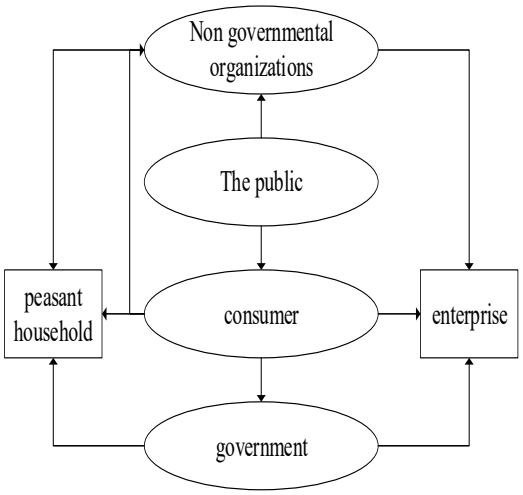


Figure 7. Structure model of the main participant of rural enterprise economic participation

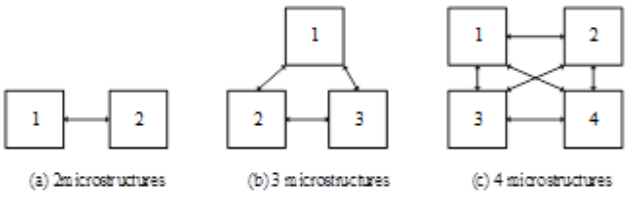


Figure 8. Demonstration of the relationship among rural enterprises and economic participants

3.3. Construction of index system of economic development mechanism of rural enterprises under the mechanism of ecological environment protection

A scientific and reasonable index system should accurately reflect the evaluation results. The selection of the index not only affects the feasibility and accuracy of the evaluation results, but also affects the degree and importance of the future development of the agricultural circular economy. Thereby, the evaluation index system of the agricultural circular economy development mechanism should be a multi-form index system. It should not only reflect the essence of agricultural circular economy, but also combine the characteristics of economy, resources, environment and society (Xu *et al.*, 2018). The following principles should be followed. First, the systematic principle. The economic development of rural enterprises should be monitored. The development plan should involve the development of the agricultural sector and the development of the national economy of other sectors. For example, in rural areas, the economic development of enterprises means that the horizontal finance, investment, commerce, science and technology and other functional departments directly support the agricultural economy, the trade, production, circulation, agricultural resource recycling, agricultural waste treatment and other vertical industries such as ministries and commissions, as well as the coordination of service industry and regional and industrial enterprises in all aspects (Wang *et al.*, 2020). Thereby, it should be ensured that the government, agricultural enterprises, farmers and the public use various incentive measures and practical farming methods to promote the realization of the economic mechanism of rural enterprises through the effective distribution of micro participants in the rural enterprise economy (Zhou *et al.*, 2019). Second, the principle of science. Based on science and objectivity, the mechanism of the agricultural circular economy must be based on the concept of circular economy and the relevant theoretical basis of agricultural circular economy (Hota *et al.*, 2019). The basic goal of the economic development of rural enterprises is to apply and guide the development of the agricultural economy, society and environment. Finally, it should be in line with the principle of understanding and quickly combining their own characteristics in practice. The economic development business of rural enterprises must be based on the quantitative test of computational methods to measure the quality objectives, and combined with the overall requirements and specific tasks. The superiority of the mechanism is taken as the driving force for the production and operation of agricultural enterprises. Figure 9 presents the evaluation roadmap of the economic development mechanism of rural enterprises.

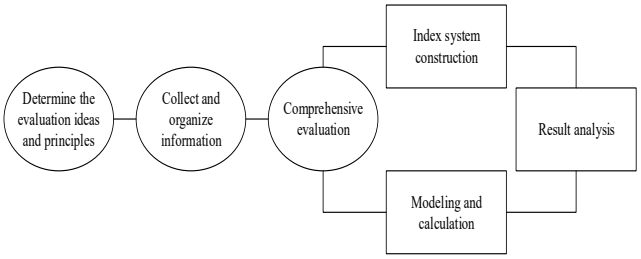


Figure 9. Evaluation roadmap of rural circular economy development

3.4. Construction of index system

In order to reflect the comprehensive situation of rural enterprise economic system under the ecological environment protection mechanism, the main indexes affecting the rural economic development mechanism and management mechanism are identified, which are divided into ecological indexes and economic indexes, as shown in Figures 10 and 11 below.

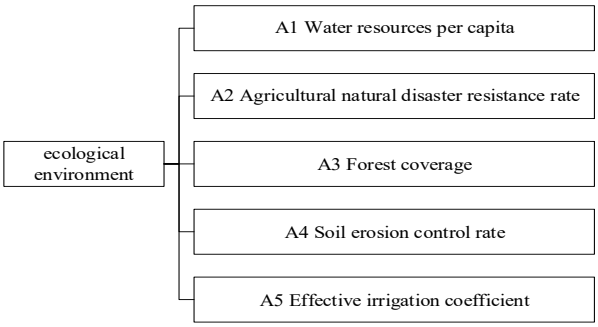


Figure 10. Index system of economic development mechanism of rural enterprises under ecological environment

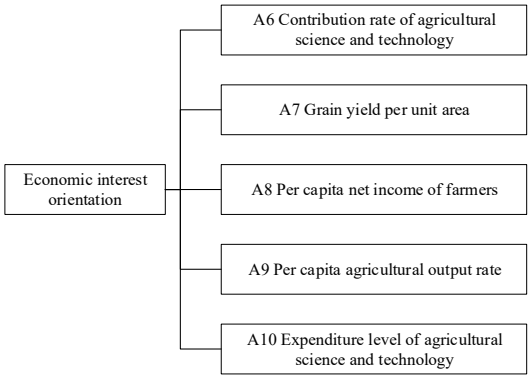


Figure 11. Enterprise economic development index system

Among them, the amount of water resources per capita represents whether a country is rich in resources, and it reflects the amount of water resources occupied by each person. Natural disaster resistance rate plays a very crucial role in the sustainable development of rural enterprises, and reflects the resistance of agricultural products to natural disasters (Chen *et al.*, 2019). Natural catastrophes including hurricanes, floods, fires, earthquakes, and tornadoes pose a yearly threat to agricultural production. Agriculture is easily damaged by natural disasters and catastrophes because it depends on the weather, climate, and availability of water to survive. Forest coverage has the function of promoting the development of agriculture, which represents the self-purification function of the environment of agricultural products. The efficiency of soil erosion control reflects the level of people's normal circulation of agricultural products, which represents the ability of water loss to regulate the circulation function of rural enterprises.

In the index system of enterprise economic development, the contribution rate of science and technology indicates the role of science and technology in the development of rural enterprises. The grain output reflects the relative income, and the yield per mu reflects the income of agricultural products.

3.5. Evaluation method of economic development of rural enterprises

In the study of the economic development of rural enterprises, the factors involved in the establishment of the index are very complex, and the data to fully meet the research needs are limited, so it is difficult to deal with common methods. However, the use of the projection pursuit method can better avoid the trap of high-dimensional phenomenon, and use its technology to reduce the evaluation dimension of multi-factor changes, which can effectively solve the problem of a lot of calculations. The traditional evaluation method has no unified theory and calculation method to determine the weight of the index. Projection pursuit method based on real number accelerated genetic algorithm is employed (Partlova *et al.*, 2020). The modeling process is as follows

The first is the standardization of the sample evaluation set. *a^(m,n)* is the *n*-th index of the *m*-th collected sample. Among them, $a_{min}(n)$ and $a_{max}(n)$ represent the minimum and maximum values of indexes, and *a(m,n)* is the sequence of index data standardization. The following equation can be used for data standardization.

$$a(m,n)=\frac{a\wedge(m,n)-a_{\min}(n)}{a_{\max}(n)-a_{\min}(n)} \tag{3}$$

$$a(m,n)=\frac{a_{\max}(n)-a\wedge(m,n)}{a_{\max}(n)-a_{\min}(n)} \tag{4}$$

Then, the prediction index function f(a) is constructed, where the one-dimensional prediction value of the prediction direction is b(m), the standard deviation of the prediction value is C_b, and the local density of the prediction value is D_b. The specific expression is as follows:

$$b(m)=\sum_{m=1}^{p}a(n)b(m,n) \tag{5}$$

$$C_b=\sqrt{\frac{\sum_{i=1}^{n}(a(n)-E(a))^2}{n-1}} \tag{6}$$

$$D_b=\sum_{m=1}^{i}\sum_{n=1}^{i}(W-w(m,n))v(W-w(m,n)) \tag{7}$$

The prediction index function can be expressed as:

$$f(a)=C_bD_b \tag{8}$$

The next step is to optimize the index function. When the sample dataset of predicted values is determined, the prediction function only changes with the prediction direction. If the direction is different, that is, the structure of this group of data is different, the optimal prediction direction can express the data structure more clearly, and the optimal prediction direction can be estimated by calculating the maximum value of the prediction index function.

Constraints:

$$\sum_{n=1}^{p}a^2(n)=1 \tag{9}$$

Maximum function:

$$f(a)=C_bD_b \tag{10}$$

The last is to sort the indexes. The importance of indexes can be obtained by sorting the predicted values of each sample.

Real coded accelerated genetic algorithm. First, the following linear transformation is used to optimize variables for real number coding.

$$a(n)+y(n)(b(n)-a(n))=x(n) \tag{11}$$

Moreover, the parent population is initialized. Next, the evaluation fitness of the parent population is solved, and the evaluation function is defined as:

$$y(n,m)=a(1-a)^{j-1} \tag{12}$$

Next, the selection operation is performed. The specific selection process can be expressed as follows:

$$q_0=0 \tag{13}$$

$$q_i=\sum_{n=1}^{i}y(n,m) \tag{14}$$

Next, the crossover operation and mutation operation are conducted on the parent population, and finally fall evolution is performed. The above is the standard real number coded genetic algorithm. The algorithm will make the change interval of the excellent index gradually narrow and get closer to the optimal index.

4. Result analysis

4.1. Determination of optimal prediction direction

The change of objective function is obtained according to the above modeling steps and real number coded accelerated genetic algorithm, as shown in Figure 12. Figure 13 displays the optimal prediction result.

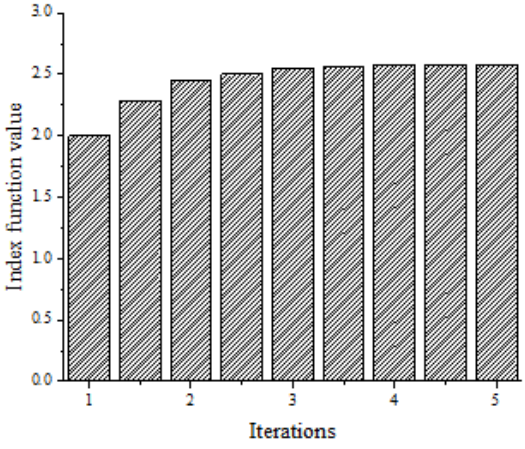


Figure 12. Change trend of the index function

Figure 12 reveals that when the acceleration times of the objective function is 5, it can meet the experimental requirements, and the maximum prediction index value is 2.5883. Figure 13 displays that the corresponding optimal prediction direction is: A1=0.0856; A2=0.1334; A3=0.1977; A4=0.2123; A5=0.2543; A6=0.1932; A7=0.2168; A8=0.2693; A9=0.2168; A10=0.1933.

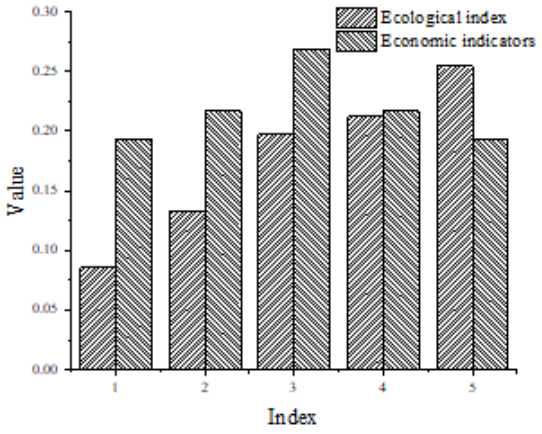


Figure 13. Statistical chart of optimal prediction results

4.2. Calculation and ranking of predicted value

The optimal value obtained is calculated according to equation (5). The calculation results are sorted from large to small, and the economic development of rural enterprises in different years can be obtained. Figure 14 presents the specific results.

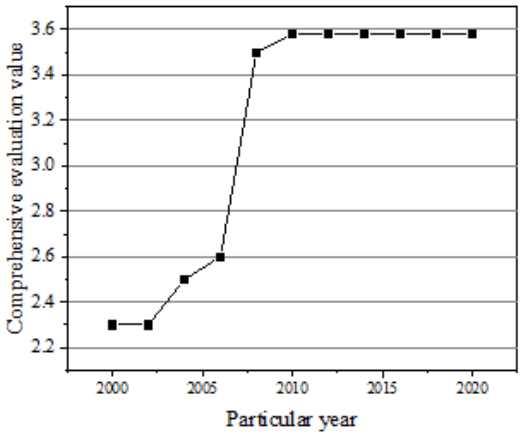


Figure 14. Distribution of economic forecast values of rural enterprises

Figure 14 proves that the economic development of rural enterprises from 2000 to 2008 is not optimistic; in recent years, the economic development of rural enterprises is relatively good, and the follow-up needs to be steadily improved.

4.3. Comprehensive evaluation

The evaluation of rural circular economy development is the model projection pursuit evaluation model based on a real number coded accelerated genetic algorithm. The advantages of evaluation method are, it can compress multiple indexes into one-way indexes for evaluation, avoid the negative influence of subjective factors on

decision-making to a large extent, and significantly reduce workload. However, the slowness of genetic algorithms is frequently criticized. They can be expensive to implement and difficult to optimize. It can not only obtain the advantages and disadvantages of the economic development evaluation of rural enterprises in different years, but also reflect the overall evaluation index of each sample to evaluate the importance. In different years, the final experimental effect is relatively good (Rauer, 2021). First, the calculated values of the Figures in the comprehensive evaluation result table and the samples of the projection value distribution model of the one-dimensional projection map in different years can reflect that the development level of circular economy of rural enterprises in China is increasing year by year, which is the basic judgment in line with the actual situation, and has high credibility for the overall evaluation of the development mechanism of agricultural circular economy (Piven, 2019). The evaluation has a crucial reference value for the formulation of national policies and management mechanisms for the development of circular economy in rural enterprises. Furthermore, based on the best prediction direction of all indexes, the most influential indexes are combined with the normalization of all indexes, the changing trend of all indexes is obtained, and then analyzed.

Under the ecological environment protection mechanism, the crucial influence degree of each factor index on the economic development and management mechanism of rural enterprises is analyzed. Effective irrigation coefficient: the above analysis suggests that A1=0.0856; A2=0.1334; A3=0.1977; A4=0.2123; A5= 0.2543, which indicates that irrigation coefficient, effective control of soil erosion rate and forest coverage rate exert a significant impact on the economic development and management mechanism of rural enterprises (Marmul, 2019). If a country wants to develop rural enterprise circular economy, it must effectively improve irrigation level, control soil erosion rate and forest coverage rate to ensure the development of rural enterprise economy and management mechanism. However, the impact of per capita water resources is small, which shows that China's per capita water resources is a failure index for the development of agricultural circular economy and must be greatly improved (Enkovsky and Kucherenko, 2020). The incidence of agricultural natural disasters exerts little impact on the development of agricultural circular economy. It shows that China's agricultural ability to resist natural disasters still needs to be improved.

In the economic evaluation index, the crucial influence degree of each factor index on the economic development and management mechanism of rural enterprises is as follows: A6=0.1932; A7=0.2168; A8=0.2693; A9=0.2168; A10=0.1933. This shows that the per capita output of agricultural products has the greatest impact, indicating that the output of agricultural products has been increasing steadily in recent years, followed by the impact of agricultural products science and technology, indicating that the development of agricultural products science and technology is relatively fast in recent years. Finally, the rural per capita income shows that the income of farmers should be focused on, and the impact on the expenditure index of agricultural products is not great. It shows that there are some defects in the management of rural enterprises in this aspect, which still need to be improved.

5. Conclusion

The development of rural enterprise economy has been studied systematically. The process and mechanism of circular economy of rural enterprises are formulated based on the basic theory. The restrictive factors and development mechanism of rural enterprise economic development are analyzed. Combined with the current situation and existing problems, based on the concept of ecological environment protection, the overall framework of rural enterprise circular economy and its development mechanism is designed. On this basis, effective irrigation coefficient, per capita water resources, agricultural natural disaster resistance rate, forest coverage rate, soil erosion control rate, agricultural product output, agricultural science and technology contribution rate, per capita agricultural product output and agricultural financial expenditure are taken as evaluation indexes. The model projection pursuit evaluation model of real number coded accelerated genetic algorithm is adopted to analyze the economic and management mechanism of rural enterprises under the mechanism of ecological environment protection. Finally, the rural per capita income demonstrates that attention should be paid to farmer income, as there is little significant impact on the expenditure index for agricultural items. It demonstrates that there are some shortcomings in rural enterprise management in this area that still need to be fixed. According to the evaluation results, it is expected to provide reference for the sustainable development of rural enterprise economy.

Although the economic development and management mechanism of rural enterprises have been systematically evaluated, the selected research indexes are limited due to the influence of conditions, which is not enough to cover the overall situation. In the later stage of research, the research indexes that are difficult to obtain should be further studied to improve the comprehensiveness of the research results.

References

Arifin B., Wicaksono E., Tenrini R.H., Wardhana I.W. and Handoko R. (2020). Village fund, village-owned-enterprises, and employment: evidence from indonesia. *Journal of Rural Studies*, **79**, 382–394.

Bilal M., Rasheed T., Iqbal H.M.N. and Yan Y. (2018). Peroxidases-assisted removal of environmentally-related hazardous pollutants with reference to the reaction mechanisms of industrial dyes. *Science of the Total Environment,* **644**(10), 1–13.

Chen X. (2019). Rural collective economy, township planning and the rural revitalization strategy -- case study for the suburbs of beijing city. *The Journal Of Investment Management,* **8**(6), 94.

Chen Z., Chen J., Zhang Z., Zhi X. and Xin X. (2019). Does network governance based on bankse-commerce platform facilitate supply chain financing?. *China Agricultural Economic Review,* **11**(4), 688–703.

Enkovsky V.P., and Kucherenko M. (2020). Factors of the organization and peculiarities of small enterprises activities in rural green tourism. *University Economic*, **44**(2), 24–30.

Feng J., Zhao Z., Wen Y. and Hou Y. (2021). Organically linking green development and ecological environment protection in poyang lake, china using a social-ecological system framework. *International Journal of Environmental Research and Public Health*, **18**(5), 2572.

Gao X.Y., Xiang W.F. and Jun l. (2019). Research and application of distributed data mining method for improving rural power grid enterprises in production and operation status evaluation. *Journal of Northeast Agricultural University(English Edition)*, **75**(02), 89–98.

Hota P.K., Mitra S. and Qureshi I. (2019). Adopting bricolage to overcome resource constraints: the case of social enterprises in rural india. *Management and Organization Review*, **15**(2), 371–402.

Huang P. (2019). In search of a long-term development path for china: starting from differences between assigning responsibility and contracting. *Rural China*, **16**(2), 157–183.

Lesnykh S.I. (2021). Implementation of the environmental legal mechanism of nature protection for regulating recreational activities in a particular territory. *IOP Conference Series: Earth and Environmental Science,* **629**(1), 012076.

Li X. (2020). The establishment of rural tourism marketing model based on enterprise economic perspective. *Modern Management Forum*, **4**(2), 26.

Lin H. and Xia L. (2021). Research on cooperative protection mechanism of ecological environment. *IOP Conference Series Earth and Environmental Science*, **772**(1), 012087.

Liu G., Yang Z., Zhang F. and Zhang N. (2022). Environmental tax reform and environmental investment: A quasi-natural experiment based on China's Environmental Protection Tax Law. *Energy Economics*, **109**, 106000.

Luca L. (2018). The role of planning in shaping better urban-rural relationships in bristol city region. *Land Use Policy*, **71**, 311.

Marmul L. (2019). Principles and mechanisms of management and regulation of agricultural enterprises 'labor resources development. *University Economic,* **40**(2), 25–31.

Maulana F.I. and Pratama F.C. (2021). The sustainable development goals in boon pring tourism village turen malang with swot methods. *IOP Conference Series: Earth and Environmental Science*, **739**(1), 012051.

Mihály M. (2019). Opposing peripheralization? a case study of rural social enterprises in hungary. *ACME*, **18**(2), 551–575.

Mtisi S. (2020). The characteristics and constraints of rural enterprises. *International Journal of Humanities and Social Science*, **4**(1), 7–16.

Nie X., Shu T., Guo H., Bai B. and Li X. (2020). Research on beijing-tianjin-hebei ecological and environmental protection cooperative development. *IOP Conference Series Earth and Environmental Science*, **601**, 012022.

Niu L. and Xiao L. (2021). Ecological environment management system based on artificial intelligence and complex numerical optimization. *Microprocessors and Microsystems*, **80**(3), 103627.

Partlova P., Strakova J., Vachal J., Pollak F. and Dobrovic J. (2020). Management of innovation of the economic potential of the rural enterprises. *Marketing and Management of Innovations*, **2**, 340–353.

Piven A. (2019). Organizational and economic mechanism of management of agro-industrial enterprises integration. *Actual Problems of Innovative,* **3**(2), 46–53.

Rauer D. (2021). Small and medium-sized enterprises in rural areas of the czech republic and their approach to management auditing. *SHS Web of Conferences* **90**(1), 01017.

Sidhu R.K. (2018). Economic analysis of garment construction enterprise adopted at house hold level by rural women of district mansa. *Journal of Krishi Vigyan*, **7**(1), 62.

Wang L., Li Z. and Zhang Y. (2019). Identification of key factors of cooperative governance for village environment based on rural revitalization strategy. *Chinese Journal Of Eco-Agriculture,* **27**(2), 227–235.

Wang R.Z., Yingheng H. and Deyuan. (2020). Research on financial support for the new types of agricultural management entities from the perspective of the rural revitalization strategy. *Contemporary Social Sciences*, **26**(06), 28–46.

Wang W., Zhang L., Zhang W., Tao L. and Liang H. (2018). An analysis of the impact of economic-ecological balance mechanism based on non-linear partial differential equations on land financial teaching methods. *Journal of Geoscience and Environment Protection*, **06**(10), 28–39.

Wei C., Huang K., Zhang N., Qin X. and Siddique A. (2021). Discussion on ecological protection technology of high and steep slope of expressway. *IOP Conference Series: Earth and Environmental Science*, **632**(2), 022022.

Xiang W.P., Chang T., Bai X. and Wang. (2019). coupling between ecological environment vulnerability and multidimensional poverty: an empirical analysis from 1586 poverty-stricken villages in hechi city, guangxi, southwest china. *The journal of applied ecology*, **30**(12), 4303–4312.

Xu X. (2021). Mechanism and test of the impact of lack of human capital on ecological development in innovation sector. *Mathematical Problems in Engineering,* **2021**(8), 1–8.

Xu X., Ma Z., Chen Y., Gu X., Liu Q. and Wang Y. (2018). Circular economy pattern of livestock manure management in longyou, china. *Journal of Material Cycles and Waste Management,* **20**(2), 1050–1062.

Yeshchenko M., Fasolko T., Dolgalova O., Mykhalchenko H., and Udovychenko I. (2020). Legal provision of the state administration of the ecological component of sustainable socio-economic development. *Management Theory and Studies for Rural Business and Infrastructure Development*, **42**(4), 415–421.

Yuan H. and Nie H. (2018). A study on the effect of the operating mechanism in environmental protection industry. *Ekoloji,* **27**(106), 613–618.

Zhou Q., Gao P. and Chimhowu A. (2019). Icts in the transformation of rural enterprises in china: a multi-layer perspective. *Technological Forecasting and Social Change,* **145**(8), 12–23.