

Forest Property Mortgage Loan Risk Management based on K-means Clustering Algorithm

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Abstract: The reform of the forest tenure system has made the use or ownership of forest resources on the market a factor of production, which has given birth to the reform of the forest investment and financing system, thereby expanding the financing channels for forest farmers. Under such circumstances, forest rights mortgage loans have been gradually launched in various places as an innovative product to improve the forest market. The establishment of the loan company can not only effectively solve the problems of mortgage loans and forest financing difficulties, promote the rapid growth of forest economy, promote the income and wealth of forest farmers, but also bring new opportunities for market development. This paper analyzes the risk management of forest lease mortgage loans based on the K-means grouping algorithm, and aims to analyze the management situation, methods and market of forest lease mortgage loans in order to establish a complete risk management system and extend the risk period. Forest mortgage project. The ability to identify and resolve risks and promote their sustainable development. By using the K-means grouping algorithm, research and experiment on mortgage agents, purchases, etc. The experimental results show that 90% of the factors that affect the risk management of forest mortgage loans are weighted. In order to strengthen the reasonable management of forest mortgages, it needs to be improved gradually.

1 Introduction

Forest property mortgage is a new market institution mortgage business. Due to many complex characteristics, such as long forest investment cycles, high operational risks, difficult market asset management, high market volatility, and current new forest products, forest rights mortgage loans also have many problems. Therefore, market institutions are in the process of developing risky assets. Will face many risks, forest property mortgage business. A comprehensive analysis of the

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risk points in the process of forest rights mortgage loans is the prerequisite for effective control and mastery of the risks of mortgage forest rights loans. As the forest property mortgage loan is my country's first financial product and it has just started, it has no experience in risk prevention. In order to avoid losses, the current government is not very sure about this new type of business. As a result, forest farmers cannot obtain financial support for forestry development, which seriously hinders the development of forestry in my country.

As a more practical technical method in cluster analysis, means algorithm has high research value. At the same time, it has the characteristics of reliable theory, fast convergence and simple algorithm, which has been widely used in many industries. However, the k-means algorithm still has some areas that need further improvement, such as a random initial value determination method, the setting of the K value needs to be set manually by the user, and the existence of the Euclidean distance treats the attributes of different dimensions of the data item equally, etc. problem. In addition, the classic k-means clustering algorithm performs clustering under the assumption that the objects, attributes, and attribute values of the data is not considered, the clustering is performed. It may have a certain impact on the clustering results, leading to inaccurate final clustering results. Most forest property mortgages based on the K-means clustering algorithm focus on practical research and exploration, and lack systematic and in-depth risk prevention theories. In view of the current situation of my country's permanent forest mortgage, an in-depth and comprehensive analysis of the risks that may be encountered in the process of forest mortgage and their causes has been carried out, in an effort to provide some practical suggestions for this risk. Forest property mortgage.

The scientific evaluation of the value of forest trees and forest land is the basis for realizing forest rights mortgage. It not only provides a management basis for forestry managers, but also calculates the value of collateral in forest collateral. Yu Q deeply analyzed the potential risks in the mortgage process, which is a prerequisite for effective prevention and control of mortgage financial risks. Comprehensive risk management not only requires financial institutions to improve their own risk prevention awareness, but also requires the active cooperation of relevant service institutions and the support of relevant policies. Paying close attention to the development and practice of forest property mortgage loans, studying the process analysis and potential risks of its operation, and proposing comprehensive risk management countermeasures are objective propositions put forward by practice and theory, but they lack specific experimental data [1]. Through research on risk management of forest tenure mortgage loan credit project, Aziz ME aims to deeply analyze the interest appeals of the main stakeholders in each link of the forest tenure mortgage credit project, as well as the risk exposure and the reasons for the risk, in order to establish a comprehensive risk management The system improves the risk awareness and ability of commercial banks for forest property mortgage credit projects, but the development direction is relatively vague [2]. Li W fully understands and analyzes the risk's manifestations and causes. At the same time, build a specific management model to improve the level of risk management. During the operation of the bank, the mortgage loan risk is one of the risks that the bank must control. Research on the risk of forest resource asset mortgage loans can ensure the safety of bank operations and obtain the best results of risk control with minimal cost or loss, but it is relatively unfounded [3].

The innovation of this article lies in the use of K-means clustering algorithm and specific investigation and experiment methods to deeply analyze and study the risks of forest property mortgage loans and the influencing factors of their development. In order to establish a sound risk prevention mechanism, based on K-means clustering Algorithmic forest property mortgage loan risk management analysis research provides data analysis.Financial institutions successfully developed

forest property mortgage business.

2. k-Means Clustering Algorithm

2.1. Introduction to K-means clustering algorithm

The k-means algorithm (also known as k-means or k-means) is a classic algorithm used in many aggregation operations. It is the distance from the data point to the prototype as the objective function of optimization [4]. The algorithm uses the method of function to find the limit to perform iterative operations, divide the data set into different types, make the evaluation index J the smallest, and make the generated class distances close [5-6].

2.2. Description of K-means clustering algorithm

The K-mean algorithm is a classic grouping algorithm based on the partition method [7]. The main idea of the algorithm is to try to give a partition ($a \le f$) to f objects, and each partition represents a cluster (class). According to the similarity between them and the centers of each cluster (class), they are assigned to the most similar clusters (classes) [8-9]. Then compare each object with the average value of each cluster, and assign the object to the most similar cluster (class) [10]. This process is repeated until the objective function converges to a minimum. The quality of the clustering effect is represented by the objective function H:

$$H = \sum_{i=1}^{a} \sum_{j=1}^{f_{i}} d_{ij}(x_{j}, b_{i})$$
(1)

When H takes the minimum value, the corresponding grouping mode is the best shape. The K-means algorithm is described as follows:

(1) Object k is selected from n data objects as the initial aggregate category center

(2) Assign each remaining object to the nearest cluster according to the distance from the center of each aggregate category

(3) Use formula

$$H_{j} = \frac{1}{b_{j}} \sum_{i \in f_{j}} x_{j}$$
⁽²⁾

Recalculate the center of each class. And recalculate the center of each class [11-12].

(4) Calculate the new allocation method: assuming that x is in class f, if

$$\left|\boldsymbol{x}_{i}-\boldsymbol{d}_{m}\right|^{2}\leq\left|\boldsymbol{x}_{i}-\boldsymbol{d}_{n}\right|^{2}$$
(3)

Assign the sample x to the class m, and then calculate the value of the criterion function aftertheassignment at this time.

(5)If

$$|\boldsymbol{H}_{1}^{-}\boldsymbol{H}_{2}| \leq \varepsilon \tag{4}$$

Stop calculation, otherwise

$$b = b + 1 \tag{5}$$

Go back to step (3)(4)(5) again. The k-means clustering algorithm will be affected by the selected similarity measurement method, and the similarity measurement method is often used [13-14]. Using the error sum of squares criterion function to improve the performance of the aggregation category, the error sum of squares criterion function formula is:

$$F = \sum_{i=1}^{n} \sum_{k \in \mathcal{X}_{i}} \left| k - \boldsymbol{m}_{i} \right|^{2}$$
(6)

The formula represents the mean value of sample H, which is defined as the formula:

$$m_{j} = \frac{1}{k} \sum_{j=1}^{K_{j}} \chi_{j}$$
 (7)

2.3. Performance Analysis of K-means Algorithm

The K-means algorithm is used to measure specific points in the sample. When encountering grouping problems, the algorithm can complete the task more efficiently. Even when dealing with large data sets, the algorithm has high scalability and high performance [15]. The clustering results show that when the k-means clustering algorithm is used, the difference between clustering and clustering is obvious, and the clustering results are better [16-17]. The main disadvantage is that the K-Means algorithm usually leads to completely different results, setting different k values. You can first use this algorithm to analyze the data distribution [18-19]. For example, center, hierarchical grouping and density, etc., and then select an appropriate value k until the center of the cluster is close to a constant [20].

3. Forest Property Mortgage Loan Experiment

3.1. Risk Management

The risk management of forest rights mortgage loan is to grasp the degree of risk through analysis, identification, evaluation and treatment of various risks that may occur when financial institutions issue loans to forestry enterprises or individual forest farmers. The content of the risk management model will vary according to the company's business content and circumstances and the company's investment department. However, no matter which model has similarities, it is possible to create a model with universally applicable principles. The traditional international investment risk management model mainly includes risk types, risk assessment and risk disposal. But the risk management model considered by everyone is a dynamic model, with particularity and timeliness.

3.2. Forest Property Mortgage Loan

Forest rights mortgage refers to the ownership of forest rights by the forest owner, which becomes a guarantee for the forest rights as a creditor's rights. When the debtor fails to perform the corresponding debt, the mortgage has the right to transform or dispose of the forest rights and priority to be used in accordance with the law. In the forest rights mortgage relationship, the mortgage is called the mortgage lender; the mortgaged property provided by the mortgage is called the mortgage. From the perspective of the physical and socio-economic characteristics of forest assets, forest rights, as a kind of property rights, have the common characteristics of general property rights, as well as their own inherent characteristics.

3.3. Experimental Method

According to the needs and the collection of relevant literature and case data, the following research methods are selected here:

(1) File retrieval method:

First select the object to be researched and the research purpose, and then obtain relevant research data through books, journals, field research, etc. Then analyze and summarize the data to be able to accurately understand the problem to be studied. The method of book topic research is widely used in the research of various disciplines. By understanding the history and current situation of my country's mortgage forest business, it helps to determine the research theme and give an overall impression of forest mortgage risk management. It is very useful to get comparative data from real data to understand the overall situation of things. The analysis and summary of this article provide a strong argument.

(2) Inductive method:

Summarize everything and draw some laws from it; subtraction is the opposite, starting with understanding things as a whole. For example, when the document discusses the issue of mortgage loans in our country, it goes from general to expert, and then from expert to general. The integrated application of induction and subtraction methods makes the document view clear and sufficient.

(3) Investigation and analysis method:

Select a specific object in the research topic, search for information related to the topic and the research object, and analyze the collected data. This article examines the content of risk management factors of forest property mortgage loans.

4. Forest Rights Mortgage Loan Risk Analysis

4.1. Definition of Forest Property Mortgage Loan

Generally speaking, forest rights usually refer to forest property rights, which are the core of the forest system. At present, relevant experts and scholars in my country have put forward different definitions of forest rights, and summarized them according to themes, objects and contents. As shown in Table 1:

Definition Type	Subject	Object	Content
Gu Shansong	Subject of Rights	Forest, woods,	Right to use,
_		woodland	profit decision and
			transfer
Huang Liyan	Owner of rights	Forest resources	Ownership,
			usufruct, and
			security rights
Zhou Xunfang	Owner of rights	Forest resources	Ownership
			and use rights
Chen Genchang	Subject of Rights	Forestry	Vertical:
		Assets	Ownership and its
			derived use rights
			and benefits
			Rights and disposal
			rights;
Liu Hongming	Country,	Forest, woods	Ownership,
	collective,	And woodland	Use Right and
	Natural person,		Forest Land
			Contract
			Management Right

Table 1. Comparison of forest rights definitions

Forest property mortgage is the abbreviation of forest resource mortgage. This means that in accordance with laws, policies and regulations, the forest property rights and forest land use rights listed in the "Forest Title Certificate" held by the borrower or a third party are used as collateral. After the registration is completed, the forest management department confirms the property rights and grants loans. When the debtor fails to perform the debt owed or the mortgage is realized by the parties, the lender has the right to receive the mortgage payment first

4.2. Forest Rights Mortgage Loan Risk Factors

The analysis of the risk factors of the forest property mortgage loan project is based on the comparison of risk factors in order to more accurately reflect the relationship between different risk indicators and the development of market institutions. The judgment of each factor is shown in Table 2:

Serial number	Loan risk factors	
1	Lender factor	
2	envirnmental factor	
3	Financial institution's own factors	
4	Forest area	
5	Woodland management level	

Table 2. Factors affecting forest rights mortgage loan risk

It can be analyzed from different economic angles, or it can be analyzed from a macro perspective. If you analyze from a different economic perspective, you can usually consider laws and regulations, policies, regulatory systems, and economic environment from a micro perspective, which should include the management level and financial strength of financial institutions. Quality and staffing and local economic development. The following figure shows the first-level indicators of forest property mortgage loan risk factors as shown in Figure 1:



Figure 1. First-level indicators of risk influencing factors of forest rights mortgage loans

The weight of the financial institution's own factors in the primary index accounts for a large proportion. Therefore, it is the factor that has the greatest impact on the risk of commercial forest tenure mortgage loans. It occupies a dominant position in the risk factors of commercial forest tenure mortgage loans and determines to a large extent For the improvement and construction of financial institutions themselves. Finally, all available index weight indexes are shown in Figure 2:



Figure 2. The weight value of the risk influencing factors of forest property mortgage loan

4.3. Forest Property Mortgage Loan Market

A major dilemma faced by forest rights mortgage loans is that the mortgage objects are difficult to realize and there is a lack of reference market pricing. Therefore, it is urgent to establish and improve the forest rights circulation market and improve the market construction of mortgage objects. An orderly and efficient forest rights circulation market can improve the financing environment for forest rights mortgages, reduce credit risks caused by market price fluctuations, and promote the sustainable and healthy development of forest rights mortgages. When accepting forest rights mortgage loans, financial institutions should focus on high-quality forest species (such as tea forests and fruit trees) and easy-to-dispose forest rights mortgages for the types of forest trees that can be mortgaged in accordance with the requirements of the Forest Law. On the premise that all procedures are legal and compliant, it is necessary to appropriately reduce the loan amount and reduce the loan risk. Before applying for a mortgage, the mortgagor should have obtained a forest logging permit before establishing a forest right mortgage, and the corresponding agency should go to the forestry administrative department for inspection. If it has been obtained, the mortgagee shall submit the original forest logging permit to the mortgagee for processing Custody, the two parties will also record with the forestry management department by the escrow contract, and the legitimate rights and interests of the people can also be protected as shown in Figure 3:



Figure 3. People's forest rights mortgage scene

5. Conclusion

In this article, based on the K-means clustering algorithm for mortgage risk analysis and research, the development of mortgage based on K clustering data means understanding the problems faced by the industrialization of forestry. First of all, the government needs to mobilize investors'

enthusiasm for forestry investment, and while obtaining economic benefits, it must also effectively improve the ecological environment. On the other hand, the expansion of forest ownership mortgage loans will lead to the development of forest property assessment agencies, forest ownership guarantee agencies, and other related agencies and industries. Only by continuously expanding the business fields of market institutions and improving the forest market conditions, and significantly promoting the market Product innovation in China. Therefore, further improving the risk management of forest rights mortgage will improve our country's rural and urban forest mortgage risk management system and contribute to the improvement of our country's ecological environment.

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Data Availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

Conflict of Interest

The author states that this article has no conflict of interest.

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