

Research on Comprehensive Risk Management of Agricultural Enterprises

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Abstract: In the current comprehensive risk management of agricultural enterprises, there are shortcomings such as low efficiency of risk data collection and low risk identification rate. Therefore, the comprehensive risk management research of agricultural enterprises is proposed. Information technology is used to investigate and collect internal and external risk information data. Then, the trend analysis method is used to identify the comprehensive risk of the enterprise, and the identification data is substituted into the risk map to estimate the risk, internal control comprehensive management is achieved by the control of management factors. Through the previous steps, the comprehensive risk management research in agricultural enterprises is completed completely. The comparison experiment between the proposed comprehensive risk management method and the traditional risk management methods is carried out, and the results shows that the proposed method is about 15% higher than the traditional method in terms of risk data collection efficiency. In terms of risk identification rate, the proposed method is about 20% higher than the traditional method.

Keywords: Agricultural enterprises; Comprehensive risk management; Risk identification

1. Introduction

Risk is a concept closely related to uncertainty. People will face some uncertainties in their daily life, such as the uncertainty of profit or loss in stock investment. Similarly, enterprises will also face uncertainties in the development process, such as uncertainty of enterprise profit. In addition, with the development of economy, enterprises are facing increasingly complex internal and external environment, and the uncertainty (risks taken by enterprises) is increasing [1]. Therefore, only those enterprises that attach importance to risks and manage them effectively can survive and develop in the fierce competitive environment. Agricultural enterprises face greater risks. Under the conditions of market economy, agricultural enterprises will face greater uncertainties [2]. According to the classical financial management theory [3], risk and value are closely related, and successful risk management will bring considerable value returns to agricultural enterprises [4]. The purpose of agriculture enterprise risk management is to identify potential issues may affect the development of the enterprise, through effective management and control of risks to provide reasonable assurance for the business goals [5]. Generally speaking, the original intention or goal of risk management activities of agricultural enterprises is to maximize enterprise value [6]. Under the guidance of this goal, the comprehensive risk management is adopted to achieve effective management of agricultural enterprises.

2. Design and Implementation of Comprehensive Risk Management Methods for Agricultural Enterprises

The steps to realize the comprehensive risk management of agricultural enterprises are as follows: firstly, the risk data of agricultural enterprises need to be investigated and collected; then, on the basis of risk data collection, the trend analysis method is adopted to identify the risk; after risk identification, the risk and impact of the risk on the enterprise is estimated; finally, the comprehensive risk internal control comprehensive management of the agricultural enterprises is implemented. Through the above-mentioned steps, the comprehensive risk management of agricultural enterprises can be realized.

2.1. Investigation and collection of comprehensive risk data of agricultural enterprises

Since there are various risks in agricultural enterprises [7], it is necessary to investigate the types and sources of risks and other information related to risks. Then, various risk data within the enterprise are collected, including information data on the implementation of management measures in functional areas of the company, and information data on business behaviors of suppliers and customers. In the work of collecting and sorting related risk data, advanced information technology is adopted to reduce artificial work tasks and effectively improve the accuracy of data collection, and the accuracy of data collection is effectively improved, on the basis of improving the efficiency of comprehensive risk management, it can

reduce the cost of work input, and thus improve the enterprise. The timeliness of comprehensive risk management ensures that the risk of the company is controlled within a controllable range, and thus the efficiency of the

enterprise comprehensive risk management can be improved. The risk investigation and acquisition process is shown in Figure 1.

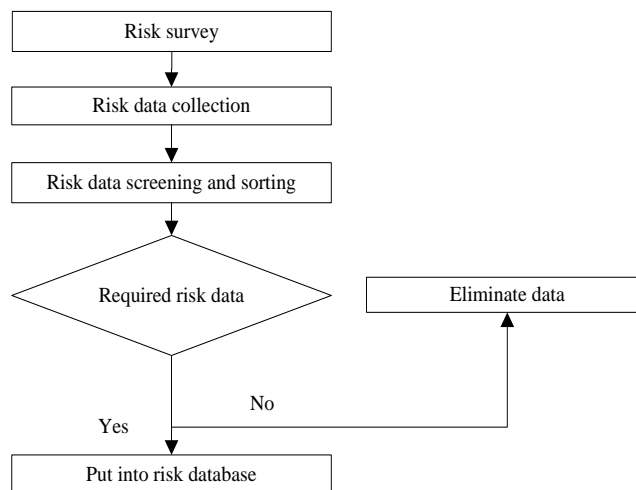


Figure 1. The investigation and collection process of agricultural enterprise risk

As shown in Figure 1, risk data are collected by risk investigation, and then risk data are screened and sorted out. Risk data related to agricultural enterprises are stored in the overall risk database, so as to facilitate subsequent data analysis, estimation, evaluation and other management, and provide basis for future comprehensive risk management.

2.2. Identification of comprehensive risks of agricultural enterprises

Identifying risks refers to finding out the risk of each business unit, various important business activities and their business processes, or what risks are the basis of risk management. Identifying risks should be combined with the goals set by the company to identify uncertainties in the achievement of the established goals. Matters arise from internal or external incidents or incidents that affect the implementation of the strategy or the achievement of the objectives, which may have adverse or beneficial effects on the business, or both. In the process of identifying risks, companies can recognize the existence of uncertainty, but do not know whether and when a matter will occur, or the exact impact it brings. In addition, companies initially consider only a range of potential issues that arise from external and internal sources, including potential issues with negative impacts, as well as those that represent opportunities. Therefore, the uncertainties affecting strategy implementation and goal realization are driven by countless external and internal factors, and companies should recognize the importance of understanding these external and internal factors and the types of issues that may arise from them. For agricultural

enterprises, the natural environmental factor is an external factor that should be considered in the process of identifying risks, because it is a matter that has a significant negative impact on the enterprise. External and internal factors that identify impacts are useful for effective risk identification. By analyzing the factors that play a major role, companies can identify and focus on those uncertainties that can affect the achievement of the goals. The trend analysis method is used to compare and analyze the data of financial statements of enterprises for consecutive periods [8], and find out the changes and trends of the related items in the report and their trends, and then identify the risks faced by the company in future production and operation activities. The financial status of an enterprise is an important aspect that reflects the financial risks faced by enterprises [9]. Many enterprises are facing great risks due to their poor financial status. Through the analysis of the balance sheet, income statement and business statement of the enterprise, they can always master the financial status of the enterprise, understand the capital risks they faced, prevent the occurrence of risks and reduce the impact of risks. As the capital problem of enterprises has a great impact on enterprises, many enterprises go bankrupt due to the break of capital chain or financial problems. Some companies have some problems that blind expansion has led to financial constraints, while subsidiaries have made financial fraud and stock prices soared. However, the actual company's huge losses, continuous deficits and stock prices have contrasted, and ultimately it is difficult to cover up their financial problems and lead to bankruptcy.

Therefore, the analysis of the financial status of the company is the key to identifying the risk of funds.

2.3. Estimation of comprehensive risks of agricultural enterprises

The role of risk estimation is to judge and measure the impacts and consequences of the identified risks on the enterprise. The risks are usually estimated by using probability and mathematical statistics. In the process of agricultural enterprise risk management, risk assessment is not a one-time activity but a continuous repetitive activity. When assessing risks, agribusinesses should consider both general and non-conventional matters. For routine and repetitive matters, agribusiness should consider it in the plan and operating budget. For unconventional matters that have a significant impact on the entity, the agribusiness should assess its risk. When assessing a number of risks, according to the assessment of the probability of risk occurrence and the degree of impact on the target, agricultural enterprises shall draw a risk coordinate diagram and compare various risks and preliminarily determine the countermeasures for various risks. In addition, since the strategic planning of an enterprise determines the risks it faces, it is necessary to estimate the risks after risk identification and impact of risks on the enterprise, and establish the scale and predict the risk results. In the process of risk estimation, the list of risk items must be arranged at first, and according to the probability of occurrence, they should be sorted. This process is consistent with the failure mode analysis. Probabilistic statistics, failure analysis, and high risk are assigned to each risk. Risks and general risks, and the risks that need to be managed according to the probability of occurrence of risks. Although some risks are large, their probability of occurrence is low, while some risks are small, but the probability of occurrence is large, and the impact on the enterprise is direct. Risk management should give priority to the risk of direct occurrence and direct impact on the enterprise.

In the process of risk estimates, at first, enterprise should rank the risk of project list, and carry on the sorting according to the size of the probability of occurrence. The following formula is adopted to calculate the probability of risk occurrence:

$$Y = a_0 + \sum_{i=1}^n a_i * X_i \quad (1)$$

In equation (1), Y represents the probability of occurrence of risk; a_0 represents a fixed value; i represents the type of risk; a_i represents different types of risk parameters; and X_i represents the proportion of this type of risk. Through this formula, the probability of occurrence of different types of agribusiness risks can be calculated, thereby realizing the estimation of risks.

2.4. Integrated management and control of comprehensive risks of agricultural enterprises

The integrated management and control of comprehensive risks of agricultural enterprises needs to develop the internal control management procedures. Internal control management procedures relative to different management bodies will be different [10]. A complete set of internal control management procedures mainly include the following steps :

Understanding the current status of internal control of the enterprise to manage the overall situation of internal control.

Implementing internal control management methods such as soundness testing and compliance testing to determine the integrity of the internal control system and the effectiveness of the implementation of the system, and obtain basic information (data) of internal control comprehensive management.

On the basis of the previous step, establishing an internal control management indicator system based on the internal control management standards established by the stratification, and choosing a scientific and reasonable integrated management method to comprehensively manage the internal control of the enterprise, and writing a standard report of the internal control management. The main management procedures are shown in Figure 2.

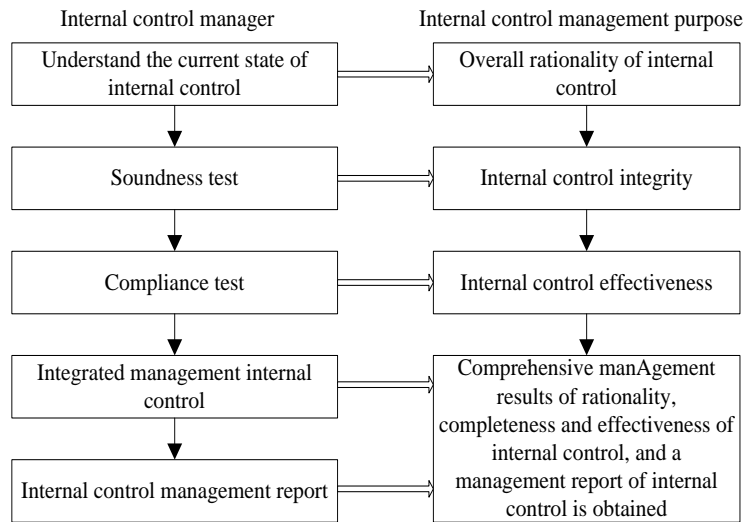


Figure 2. Internal control management procedures

The internal control activities of the agribusiness can be managed through the procedure in Figure 2. Before the start of the activity, it is necessary to determine the appropriate internal control management method according to the characteristics of the enterprise, determine the procedure, and select a reasonable management method to manage the implementation of the internal control system of the evaluated enterprise according to the management standards, and write a standardized management report with relevant information in the comprehensive management work, the key issues and weak links of the internal control of the enterprise is analyzed combined with the idea and concept of comprehensive risk management, and suggestions and opinions on risk prevention is put forward, and the practical feasibility of the internal control management report is improved.

The internal control management steps are as follows: Firstly, the categories of management factors and the hierarchical relationship between management factors in each category (including the relationship between different categories of factors at the same level) is determined, thereby forming a hierarchical set of management elements. Secondly, a set of management results $V = \{v_1, v_2, \dots, v_l\}$ is established, l represents various levels of management results, which determine the accuracy of the rating results. This step involves considerable subjective judgment, and the Delphi method can be used to determine the number of l and the critical point level. Thirdly, combining the perspective of management subject and the characteristics and contents of management object, the weight set is constructed. Specific steps are as follows:

Firstly, the weight set of factor class is established. Due to the hierarchical classification of management elements, the weight of each factor should be assigned according to its importance. Suppose u_i ($i = 1, 2, \dots, m$) whose corre-

sponding weight vector is W_i ($i = 1, 2, \dots, m$), then the weight set of this factor class is $W_i = (W_1, W_2, \dots, W_m)$. Secondly, the weight set of factors is established. In each category of elements, each factor is given a corresponding weight according to the importance of each factor. Suppose the j factor in class i is u_{ij} ($i = 1, 2, \dots, m; j = 1, 2, \dots, n$), it's weight is W_{ij} ($i = 1, 2, \dots, m; j = 1, 2, \dots, n$), then factor weight combination is $W_i = (w_{i1}, w_{i2}, \dots, w_{in})$, $i = 1, 2, \dots, m$. Third, comprehensive management of first-level factors is carried out. According to the comprehensive management of various factors in a certain category, the management object belongs to the k element in the management result set ($k = 1, 2, \dots, l$) membership is r , then the single-factor membership matrix of fuzzy comprehensive management is shown as follows:

$$R_j = \begin{bmatrix} r_{i11} & r_{i12} & \dots & r_{i1n} \\ r_{i21} & r_{i22} & \dots & r_{i2n} \\ \dots & \dots & \dots & \dots \\ r_{im1} & r_{im2} & \dots & r_{imn} \end{bmatrix} \quad (i = 1, 2, \dots, m) \quad (2)$$

Therefore, the comprehensive management of the i -th factor is shown as follows:

$$B_i = W_i \circ R_i = (w_{i1}, w_{i2}, \dots, w_{in}) \begin{bmatrix} r_{i11} & r_{i12} & \dots & r_{i1n} \\ r_{i21} & r_{i22} & \dots & r_{i2n} \\ \dots & \dots & \dots & \dots \\ r_{im1} & r_{im2} & \dots & r_{imn} \end{bmatrix} \quad (3)$$

$$= (b_{i1}, b_{i2}, \dots, b_{il}), i = 1, 2, \dots, m$$

Fourthly, the comprehensive management of the secondary fuzzy factors is carried out. The lowest level of integrated management is only to manage the various factors in a certain category, in order to consider the comprehen-

sive impact of various factors, it must also be integrated between the classes. When the comprehensive management of the factors between classes is carried out, the management type is single factor management, and the single factor management matrix should be the lowest fuzzy integrated management matrix. Fifthly, if various factors can be reclassified, multi-level integrated management can also be carried out according to the above steps.

It can be seen that the management of things requires two aspects of work: firstly, the various factors that affect things should be clearly identified. When the influencing factors of things are extremely complicated, they can be reasonably decomposed into different levels, and then the

overall fuzzy management is completed on the basis of the management of the layer-by-layer factors; secondly, the weight of each factor should be determined.

3. Experiment

In order to verify the effectiveness of the proposed comprehensive risk management method, the comprehensive risk management of an enterprise is taken as the experimental goal, and the proposed comprehensive risk management method and the traditional comprehensive risk management method are adopted respectively to compare data collection efficiency in 9 parallel experiments. The experimental results are shown in Figure 3.

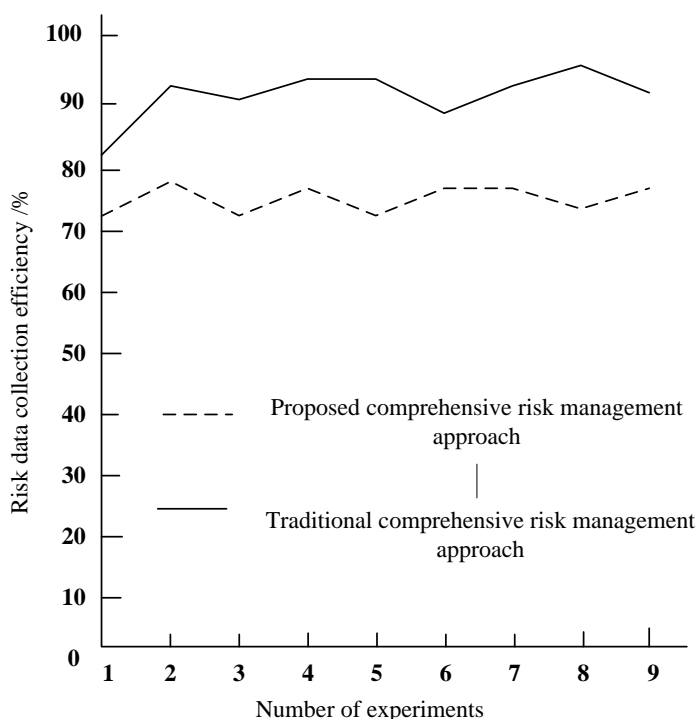


Figure 3. Comparison of risk collection efficiency between the two methods

It can be clearly seen from Figure 3 that the collection efficiency of risk data of the proposed total risk management method is almost above 90%, while the collection efficiency of the traditional total risk management method is almost 75%. The experimental results show that the

risk data can be collected more effectively by using the proposed comprehensive risk management method. In addition, a comparative experiment is conducted on the effectiveness of risk identification in the risk management process. The experimental comparison results are shown in Table 1.

Table 1. Comparison of experimental results of risk identification rate

Risk type		Recognition rate /%	
		Proposed comprehensive risk management approach	Traditional comprehensive risk management approach
Natural disaster risk		Proposed comprehensive risk management approach	Traditional comprehensive risk management approach
Market risk	Cost risk	85.12	65.26
	Sales risk	92.36	74.78
	Price fluctuation risk	93.56	75.27

	Exchange rate risk	89.25	69.32
	Food safety risk	95.26	77.18
	Policy risk	96.45	75.56
	Legal risk	89.12	68.15
	Epidemic risk	95.25	76.14

As can be seen from Table 1, no matter what type of risk, the proposed comprehensive risk management method can have a better identification efficiency. Among them, the recognition rate of food safety risk is as high as 96.45%, while the traditional comprehensive risk management method is only 75.46%. Compared with the recognition efficiency of various risks, the proposed comprehensive risk management has higher recognition rate, which indicates that it can realize risk management better.

Combined with the comparison experiment of total risk management method on the collection efficiency and recognition rate of risk, it can be found that the proposed total risk management method has higher collection efficiency and recognition rate, and can more effectively realize the total risk management of agricultural enterprises.

Combined with the comprehensive risk management method for the comparison of risk collection efficiency and recognition rate, it can be found that the proposed comprehensive risk management method has higher collection efficiency and recognition rate, and can achieve comprehensive risk management for agricultural enterprises more effectively.

4. Conclusions

At present, there are many shortcomings in the comprehensive risk management such as low efficiency of data collection and risk identification, it is necessary to learn comprehensive risk management experience from other good enterprise to improve their own risk management system. They should attach importance to the application of information technology, promote the development of the agricultural enterprise comprehensive risk management, implement the intelligent of the enterprise compre-

hensive risk management, and standardize the specific process of risk management and goal, comprehensively improve the quality of overall corporate risk management work, enhance the cohesiveness within enterprises and make the enterprise obtain the development of long-term, stable and high quality.

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