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COMPARATIVE ANALYSIS OF RISK ASSESSMENT METHODS AND THE EFFECTIVENESS OF RISK FACTOR MANAGEMENT

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ABSTRACT

The modern conditions of the market economy create the need to develop a new strategy for managing a production enterprise operating under risk, to develop a risk analysis and assessment methodology. In order to successfully manage risks, it is necessary to be able to identify, analyze and predict them. The article considers approaches to risk assessment for industrial enterprises. A comparative analysis of methods for qualitative and quantitative risk assessment is presented and general measures for risk reduction are proposed.

KEYWORDS: *risks of an industrial enterprise, efficiency of economic activity, classification signs of risks, risk assessment, methods of risk analysis, production management.*

INTRODUCTION

The process of assessing risk factors can be defined as identifying the degree (magnitude) of risk. As evidenced by the practice of analyzing methods for assessing risk factors, they can be divided into two groups: quantitative and qualitative.

Qualitative risk factor analysis is descriptive and essentially leads the researcher to quantitative risk analysis. The main task of a qualitative analysis of risk factors is the identification and identification of various types and risk factors. Along with this, it is important to determine the characteristics and assess the possible consequences of the implementation of the identified risks. Qualitative analysis, which is the first stage of risk analysis under the condition of an unstable economic environment, aims to identify factors, all types of risk and carry out a possible valuation, which is of particular importance. In this situation, an important condition is the definition of ranked and systematized risk factors that are able to fully reflect the totality of them with which to work in the process of functioning and development of the organization.

The next step in measuring risk factors is usually the quantitative assessment of organizational risk factors. The scientific literature provides a list of methods that provide their quantitative assessment.

MAIN PART

Quantitative analysis is based on the establishment of specific numerical values of the organization's risk factors. The basis of the quantitative assessment of risk factors is reflected in the theory of operations research, mathematical statistics, and probability theory. In general, the quantitative analysis of risk factors is preceded by their qualitative analysis.

In the literature on risk issues, there are usually several groups of methods that make it possible to quantify risk factors and reflect in the classification scheme of methods for assessing risk factors of an organization:

• Expert methods;

• Calculation and analytical methods;

• Statistical methods.

Statistical methods are based on the study of statistics of losses that took place in the implementation of similar types of economic activities of the organization in the past, establishing the frequency of occurrence of specific levels and types of losses and predicting the likelihood of their occurrence. Statistical methods are analyzed in connection with the concepts of boundaries and risk zones. The points that determine the level of these losses and the probability of their occurrence are outlined by using a statistical analysis of a rather voluminous array of information. The basis of the component of the group of methods under consideration is the calculation of the variance, the coefficient of variation and the standard deviation.

The bulk of the main ideas of statistical decision theory were put forward in 1933 by Pearson and Neumann. Wald developed a systematic theory for a situation in which there is no prior distribution.

In 1951, Savage and Girschik became followers of Wald's research in the field of decision theory. Morgenstern and von Neumann developed an axiomatic approach to subjective utilities, which was associated with their work on game theory.

The subsequent development of the group of methods under consideration served as an impetus for the further development of the “decision tree” method, which is widely used at the present time. This method is used to assess the risks of such decisions that have a certain number of options for the development of events. In this case, in order to build a "decision tree", the researcher must have reliable and necessary information, taking into account the time of completion of various scenarios for the development of events and their probabilities. The procedure for collecting information in order to build a "decision tree" should be reflected in the following sequence: clarification of the composition and duration of the phases of the organization's life cycle; identification of key events; formalization of all possible solutions; clarification of the probability of making each specific decision; valuation of each step to prevent risky events. Based on the results obtained, a "decision tree" is built, which includes nodes - specific work related to the implementation of the planned activities. In an unstable economic environment, the application of the considered method for assessing risk factors is ineffective due to the impossibility to explore all options for the development of events. The complexity of applying this method also lies in the fact that in order to formulate different scenarios for the development of an organization, it is important to have reliable information that takes into account the time of occurrence of various events and their probabilities.

A probabilistic approach to assessing risk factors was proposed by G.B. Kleiner, R.M. Kachalov and V.L. Tambovtsev. The authors propose to carry out risk assessment based on the measurement theory, which covers system analysis, the formation of a special model, the selection of a risk assessment scale and a method for identifying risk assessment indicator

values. This paper also proposes to form a generalized quantitative assessment of the organization's risk factors, taking into account all its participants. For each of them, the risks of individual alternatives and outcomes are initially assessed.

The group of calculation and analytical methods for assessing risk factors is based on mathematical methods. In this case, it should be borne in mind that the applied mathematical methods for measuring financial, production, economic and commercial risks are not well developed.

Simulation modeling is quite widespread in this group. Imitation is a technique aimed at conducting experiments using a mathematical model of the behavior of a system in a specific time period. Such types of imitation are known as imitation of large systems; business games; dependent and independent of the time factor; probabilistic; explicit. Under the conditions of the analysis of real options in the simulation mode and the application of a genetic algorithm, it is possible to build a general scheme for obtaining an optimal investment program, the justification of which makes it possible to take into account risk factors for the future development of individual investment projects.

The Monte Carlo method is a modified simulation model. The Monte Carlo simulation procedure itself includes certain steps:

• Identification of functional dependencies between exogenous and resulting model variables;

• Calculation of values of exogenous variables for the sample;

• Assessment of indicators of the resulting variables using the functions established at the initial stage for each sample;

• Repeated repetition of steps 2 and 3.

The main difference between the Monte Carlo method and other analytical methods is the coverage of its solution space: analytical methods include the entire space, and this method is only a part of it. This method makes it possible to sufficiently take into account all the uncertainty, and also allows you to take into account all available information.

Mathematical methods of experiment planning enable the researcher to select the optimal number of scenarios and within each of them to establish the optimal limits of factors. This allows you to determine the coefficients of multivariate regression, using a much smaller amount of calculations. The proposed approach did not attract wide interest due to insufficient development of the methodology for assessing risk factors.

Further practical application and improvement of this group of methods for assessing risk factors led to the development of the scenario method and the method of variation of decision parameters (or sensitivity analysis). The scenario method includes the development of the most probable pessimistic and optimistic options for implementing the solution, with the calculation of all final values for the solution. Sensitivity analysis can be used to initially assess risk factors in a crisis.

Currently, various methods of expert research and assessments are becoming more widespread. These methods are irreplaceable in the conditions of solving complex problems of evaluation and selection of technical objects, in particular, objects of special purpose. This method is used in

predicting and analyzing a case with a large number of significant risk factors, where it is necessary to involve the experience of intuition and knowledge of many highly qualified experts who are specialists in this field.

When choosing methods for analyzing and assessing risk factors in an organization, the following factors are crucial:

• The ability to assess risk factors in dynamics;

• The possibility of a qualitative assessment of risk factors;

• The possibility of quantitative assessment of risk factors;

• Availability of information resources;

• Simplicity of calculations.

TABLE 1 COMPARATIVE ANALYSIS OF METHODS FOR ASSESSING THE RISK FACTORS OF AN ORGANIZATION (COMPILED BY THE AUTHOR)

Method for assessing risk factors	Qualitative assessment	Quantitative assessment	Availability of information	Ability to evaluate in dynamics	Simplicity of calculations
Method of expert assessments	+	- +	+	+	+
Statistical estimation methods	+	+	-	+	+
Risk adjustment method	-	+	+	+	+
Break even point	-	+	+	-	+
Decision tree method	+	+	-	-	+
Analogy method	-	+	- +	-	- +
Simulation modeling	-	+	+	+	-
Scenario Analysis	+	+	-	+	-
Method without taking into account the probability distribution					
• sensitivity analysis;	+	+	+	+	+
• multiple value method;	-	+	+	+	+
• adjustment method;	-	+	+	+	+
• single value method;	-	+	-	+	+

Table data 1 is proposed to be used as a tool for selecting methods for measuring risk factors, depending on the current market situation and within the organization, on the degree of availability of information resources and the expected results of the assessment.

An analysis of methods for assessing risk factors made it possible to formulate the conclusion that the traditionally used risk measurement methods for stable environmental conditions cannot be effectively applied under the condition of instability of the economic economic environment.

All the considered methods do not assess the relationship between the variable risk factors of the organization, for this reason they can only be applied to a narrow range of situations and be part of the methodology for assessing the risk factors of a developing organization. In order to more effectively apply these groups of methods in practice, it is important to build the distribution of the probabilities of the implementation of specific risk factors.

Today, there are a large number of risk minimization methods presented by various scientists.

The main ways to minimize risks include: risk distribution among different agents, risk insurance, self-insurance of risks, organization of production diversification, limitation, implementation of alternative planning, creation of a flexible production structure, creation of reserve funds, information monitoring, training and training of personnel, the use of flexible technologies , risk aversion.

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TABLE 2 WAYS TO REDUCE RISK IN THE PRODUCTION MANAGEMENT OF INDUSTRIAL ENTERPRISES

Types of risk	**Ways to reduce your risk**
In the field of production	
Technical risk	Carrying out preventive measures, formation of reserve funds, insurance
Technological risk	Quality control, situation monitoring
Production organization risk	Development of promising areas of development, building a rational production structure, pursuing an effective innovation and investment policy
Labor resource risk	Professional development, personnel training, certification, accident insurance
Executive risk	Methods of motivating employees, contributing to the achievement of the goals of the enterprise (association)
Natural disaster risk	Insurance, self-insurance - formation of reserve funds
In the field of supply and sales	
Market risk	Integration processes (conclusion of long-term contracts, agreements), diversification of production
Transport risk	Self-insurance, introduction of penalties, forfeits
Warehouse risk	Introduction of resource-saving, energy-saving technologies
Risk of purchasing raw	Implementation of scientific inventory management methods

materials	
Marketing Risk	Marketing research, diversification of sales markets, creation and promotion of a trade mark (brand)

CONCLUSION

Taking into account the sectoral characteristics of industrial enterprises in production management, it is necessary to highlight the methods of risk reduction aimed at resource provision of production and effective supply activities.

Despite the variety of methods proposed for risk assessment and reduction, the accuracy of any method in their application is effective only if the calculations are consistent with the nature of risk management processes and common sense. As a result, the efficiency of risk management in the enterprise should increase.

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