Financial results of risk management of business activities of agricultural enterprises

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Abstract. The paper discusses methods for assessing the entrepreneurial risk of enterprises, identifies factors and events that trigger entrepreneurial risk, defines the parameters of acceptable risk. The nature of risk sources in agricultural production is determined. The factors influencing the cost of production and sales of products of agricultural enterprises, their business partners and investors are identified. A model is proposed for assessing critical levels of factors that separate threats into those requiring risk management and threats in which the impact of risk factors on financial results is negligible. A method for calculating the critical values of profitability, costs and capital of an enterprise, as well as their structure, on the basis of which risk can be managed, is presented.

1. Introduction

The production and business activities of any organization are associated with the uncertainty inherent in market conditions. The uncertainty of market conditions initiates a large number of factors of entrepreneurial risk, the probabilistic nature of achieving the planned goals, the occurrence of negative events and financial losses. To reduce the negative impact of uncertainty factors and ensure maximum financial results, improving the management of entrepreneurial risk and the finances of the organization is required.

In the analysis of entrepreneurial risk, methods based on assessing the probability of occurrence of an event have become widespread. Assessment of the main indicators characterizing the risk when using statistical methods is based on the analysis of limited samples, which, in turn, requires the use of hypotheses about the form of the distribution law [1].

Due to the fact that the indicators of financial results and profit depend on a large number of factors, it is necessary to use multi-parameter probabilistic models to describe the process of their change in time [2]. The determination of statistical parameters characterizing the studied population in
the conditions of limited information and the presence of rare events requires the use of complex methods.

The lack of a developed mathematical apparatus that allows describing multidimensional distributions of random variables obeying various abnormal distribution laws, limited information and the presence of rare events hinder the application of probability theory methods in analyzing entrepreneurial risk [3].

In conditions of limited information necessary to obtain reliable statistical models, expert systems, structural models, and game theory are used to analyze risk. The choice of method or combination of risk assessment methods depends on the type of activity, as well as on external and internal conditions [4].

The concept of acceptable risk allows calculating basic risk indicators that can be determined on the basis of an analysis of the costs associated with ensuring safety and the amount of damage [5]. Entrepreneurial risk is considered acceptable if the costs of its elimination and financial losses do not lead to loss of capital and the stability of the financial condition of the organization. The application of the concept of acceptable risk allows for the management of entrepreneurial risk to widely use methods of economic analysis.

2. Materials and methods

The occurrence of uncertainty in the organization's activities is associated with the conditions of functioning and development of the economy. The production of goods, works and services is based on technological processes that take time. The formation of profits and capital invested in technological processes occurs with delay. As a result of delays and due to incomplete information on the dynamics of market conditions and prices, revenue after the sale of finished products may differ from the planned values. Deviations of the actual amount of revenue from the planned value can lead to loss of profit, diseconomies, decrease in capital and loss of financial stability of the enterprise.

In the works of F.H. Knight, uncertainty and risk are associated with the time required to complete production processes. Given the diversity and heterogeneity of the organizational and legal forms of functioning of enterprises, the uncertainty of the results of production activities and the related need to choose the goal at the moment, the results of which will be obtained in the future, is one of the risk factors.

O.V. Inshakov showed that enterprises as economic entities are subject to qualitative and quantitative changes, while a change in the qualitative measure of measurement leads to a quantitative change in the resource or income and, conversely, quantitative changes are manifested in the transformation of qualitative indicators. There is an element of lag in the dynamics of the interaction of quantitative and qualitative indicators. Therefore, a change in qualitative and quantitative indicators will appear in future production cycles only after receipt and distribution of income [6].

In the process of development, a complex production system, due to internal mechanisms of self-organization, periodically passes into critical states in which the conditions of market equilibrium are not observed [7].

The emergence of critical conditions also contributes to an increase in the duration of the production cycle and the presence of seasonality in the production of agricultural enterprises [8].

Changes in the prices of resources, borrowed capital and sold products lead to a change in the level of income and profits of the enterprise. Since at the current moment of time, the technological processes are, as a rule, not yet completed, the real final results of economic activity are unknown. The lack of information about the market conditions of economic activity allows assessing only the future financial performance of the enterprise.

Uncertainty of the efficiency indicators of the use of resources and the financial results of the enterprise arise due to incomplete information both in the process of concluding and executing contracts, and the instability of the institutional environment.

Market failures, transaction costs, the complexity of institutions and financial relations strengthen the growth of uncertainty and incompleteness of forecast information. The longer and more seasonally dependent are the technological processes characteristic of agricultural enterprises, the more uncertain is the information on product prices and the financial results of their activities.
Sources of risk in agricultural production are of a different nature with a wide variety of manifestations. Agricultural enterprises should identify and assess the state of the market, the consequences of changes in natural factors, the repeating pattern of dry cycles, climatic conditions, and the level of risk of agriculture. The efficiency of resource use is determined by the key interests of organizations with which the company interacts in the course of its activities. Assessment of key indicators of resource use allows timely focusing the attention of owners and leaders of the organization on emerging issues and making effective management decisions [9].

Analysis and assessment of the risk of the activities of agricultural enterprises must take into account not only factors affecting the cost of production and sales of products, but also the attitude to risk of business partners and investors of the agricultural enterprise. The transition from one stage of the organization's life cycle (youth, growth, maturity, aging) to another stage of the cycle is associated with a change in the efficiency of the enterprise. A feature of the transition period is the ambiguity of the influence of the choice of a new type of structure of the use of resources on the efficiency and continuity of the enterprise.

There are various options for strategies for adapting the enterprise to external and internal changes, aimed at further growth and increase in the complexity of the structure or at reducing and simplifying the structure. The choice of option depends on the internal mechanisms of the use of resources, the institutional environment, the level of relations, and the nature of cooperative interactions of the enterprise with other business entities.

The specialization and growth of monoculture initiate the emergence of technological, production and financial risks of both a separate enterprise and various branches of agricultural production and agribusiness of the region as a whole.

Diversification of production in the presence of a sufficient level of capital and investment can increase productivity, sales volume, turnover of working environments and profit, reduce the cost and risk level of agricultural enterprises.

It should be noted that a prerequisite for reducing risk and increasing the efficiency of agricultural enterprises is the observance of the economic interests of all business partners. Analysis and assessment of the risk of agricultural enterprises should take into account not only the factors affecting the cost of production and sales of products, but also the attitude to risk of business partners and investors of the agricultural enterprise.

In the context of the digital economy, the reduction of the risk of activity is associated with the formation of new forms of organization of production, providing increased efficiency and profitability of agricultural enterprises in the conditions of maintaining the necessary level of diversification of production. The formation of agro-industrial clusters creates conditions for increasing the availability of information, attracting investments and introducing new progressive technologies for the production and processing of agricultural products.

Agribusiness enterprises in the cluster gain competitive advantages as a result of using internal information channels, the availability of raw materials and guaranteed sales of agricultural products. Reducing risk factors positively affects the final financial results of both large and small agricultural producers, which ultimately affects the increase in profitability of the industry as a whole [10].

The goal of entrepreneurial risk management is to ensure the efficient use of resources and finding the organization in the breakeven zone, when the resulting net profit allows satisfying the requirements of investors, the needs of shareholders and the conditions for its sustainable development.

To assess financial indicators, extrapolation methods, statistical models, time series analysis models, heuristic models are used.

Autocorrelation analysis, which is based on autocorrelation components, is used to identify trends and the seasonal component.

To process statistical data, correlation and regression analysis is used. The methods of regression analysis allow assessing the values of constant coefficients for the studied factors, testing the hypothesis of the adequacy of linear and non-linear one-parameter and multi-parameter models.
Given the non-linear nature of development, forecasting based on extrapolation of existing trends gives an increasingly less accurate result, since the longer the period during which a given trend is fixed, the shorter the time interval remains in the future during which this trend will act, which reduces information value and forecast accuracy [11].

To maintain the adequacy of the model, it is necessary to assess the impact of structural changes in production on the formation of the enterprise financial performance. A decrease in the accuracy of forecasting profit margins and an increase in errors in assessing financial results increase entrepreneurial risk [12, 13].

Algorithmic models have a higher adaptability to changes in the external and internal conditions of the enterprise’s activity: the exponentially weighted moving average model, the simple, double and triple exponential smoothing methods developed by scientists Holt, Brown, Winters, the ARMA (p, q) - GARCH-M models (p, q) [14-18].

The efficiency of resource use along with profit indicators is reflected in the indicators of return on sales, return on assets and return on equity.

Attraction of borrowed capital creates the conditions for the growth of business activity, profit and capitalization of the enterprise. However, an increase in the share of borrowed funds in the capital structure under adverse conditions, a reduction in profits and an increase in the price of borrowed capital leads to losses in net profit and an increase in the financial risk of the enterprise.

Asymmetry of information, greater availability of information about economic activities to managers of the enterprise compared to external investors, the desire to improve the financial results and profit of the enterprise lead to an excess of borrowed capital. In the conditions of excessive borrowed capital and incomplete information for external investors, an increase in the risk premium and loan prices increases the risk of the economic activity of the enterprise.

The decrease in the price of borrowed capital is associated with the availability of additional information available to external investors, which makes it possible to assess the level of asymmetry of information on financial results, the accuracy of profit forecasts and risk premiums.

The availability and reduction of asymmetry of information on financial results and profits, including in the stock market, create conditions for making more effective decisions and reducing the risk of economic activity of an enterprise [19].

Indicators of the use of borrowed capital are indicators of financial leverage, reflecting the capital structure of the enterprise. Risk analysis is based on the results of assessing the effectiveness of the use of the organization’s resources, indicators of profit and capital of the enterprise.

Based on the results of the assessment of indicators of financial results and capital, the critical values of profit and profitability indicators are determined, which characterize different levels and risk zones: risk-free area, high-risk area, critical risk area [20].

In the risk-free area, attracting borrowed capital makes it possible to increase the efficiency of the enterprise’s own capital, and provides shareholders with income higher than income from alternative methods of investing capital.

In the high-risk area, measures are required to increase the efficiency of the enterprise, reduce costs and attract capital at a lower price. Untimely implementation of measures may lead to financial dependence of the enterprise on creditors and negative return on equity. Termination of external financing of the enterprise leads to a loss of financial stability.

When an enterprise is in a critical risk zone, the financial results from the core business do not allow the efficient use of borrowed capital, the return on equity is formed from other activities. The company still has a chance to ensure an increase in the profitability of its core business and return on equity, to lower the level.

In the area of catastrophic risk, an enterprise is unprofitable and completely dependent on creditors. Additional borrowing is associated with a decrease in the real value of equity, a high risk of loss of solvency and the likelihood of bankruptcy of the enterprise.

Assessing the levels of profitability and profit indicators allows establishing the significance of entrepreneurial risk and developing measures to reduce its level at agricultural enterprises.
3. Results and discussion

The analysis of the results of the financial and economic activities of the enterprise allows assessing the sources, probability and consequences of dangerous events. Quantitative assessment of the risk level is carried out on the basis of a comparison of planned indicators of return on equity, the target value of return on equity with the amount of risk.

The target value of equity may be considered the average level of profitability in the industry, the return on government securities, the cost of borrowed capital.

The assessment of the level of risk, external and internal conditions ensures the adoption of decisions on the need and methods of influence on the formation of prices, revenue, costs and profits. Risk level assessment is carried out according to a binary scheme.

A safe level at which the amount of risk is deemed acceptable and risk treatment is not required is considered secured if the risk criterion is implemented. If the risk criterion is not implemented, the enterprise is in the danger zone, requiring decisions to neutralize the negative impact of the risk.

The condition for the implementation of the safety criterion can be formally denoted by the inequality:

\[ \text{roaz} < \text{roa} \]  

where \( \text{roaz} \) – the target value of return on equity; \( \text{roa} \) – the planned value of return on equity (the ratio of net profit to equity).

The amount of risk is equal to the reduction in the planned rate of return on capital from its target value:

\[ \delta(rk) = \text{roaz} - \text{roa} = \text{roa} \times (\lambda - 1) \]  

\[ \lambda = \frac{\text{roaz}}{\text{roa}} \]

A decrease in the planned net profit \( \delta(Pg) \) is associated with a decrease in return on capital, in the conditions of constant attraction during the reporting period for business activities advanced in capital production. Its value can be calculated using the following formula:

\[ \delta(Pg) = \text{roa} \times (\lambda - 1) \times K \]  

\[ K = cK + sK \]

where \( K \) – organization capital; 
\( cK \) – equity; 
\( sK \) – borrowed capital;

The planned value of net profit can be calculated using the following relationship:

\[ Pg = (P - eP - zk \times sK) \times (1 - st) \]  

where \( Pg \) – net profit; 
\( eP \) – profit from the sale of goods sold; 
\( zk \) – price of borrowed capital; 
\( sK \) – borrowed capital; 
\( eP \) – income (loss) received from other operations without taking into account interest payments on borrowed funds; 
\( st \) – corporate income tax rate.

Dependence (4), in turn, can be represented as:

\[ Pg = \left( (rv - 1) \times sv - sv - sc \right) - eP - zk \times sK \times (1 - st) \]  

where \( sv \) – semi-fixed costs associated with the production and sale of products;
sc – semi-variable costs associated with the production and sale of products; 
rv – profitability of variable costs equal to the ratio of revenue from sales of sold products (v) and variable costs (rv=v / sv).

Based on dependence (5), a change in the planned size of net profit $\delta(P_g)$ can be represented as:

$$\delta(P_g) = (sv*\delta(rv) + (rv-1)*\delta(sv) - \delta(sc) - sk*\delta(zk)) * (1-st) \tag{6}$$

where $\delta(rv)$ – change in profitability of semi-variable costs as a result of changes in the selling price of products; 
$\delta(sv), \delta(sc)$ – a change in semi-fixed and semi-variable costs, respectively; 
$\delta(zk))$ – change in the price of borrowed capital.

Expression (6) can be transformed and written in the following form:

$$\delta(P_g) = (sv/K) * ((\delta(rv) - 1 + r * ε(sv) - β * ε(sc) - f / (1 - f) ) * (1-st) \tag{7}$$

where $ε(sv) = \delta(sv)/sv$;
$ε(sc) = \delta(sc)/sc$;
$β = sc/sv$;
$f = sk/ck$.

For safe and sustainable development, an enterprise must have an optimal cost and capital structure. The cost structure depends on the ratio of fixed and variable costs ($β$) and determines the amount of operational risk, i.e. dependence of profit on changes in revenue from sales. The optimum cost is determined by the ability of the company to cover fixed costs at the expense of marginal income and receive the planned amount of profit from sales and net profit.

The optimal capital structure of the enterprise is achieved as a result of a compromise between the desire to increase business activity by increasing the share of borrowed capital and the risk of losses associated with the problems of repayment of interest on loans.

A dependence linking indicators characterizing the cost structure, the return on variable costs, the price and capital structure, as well as the amount of entrepreneurial risk, taking into account dependencies (2) and (7), can be represented as:

$$(P_g / sv) * (λ - 1) / (1-st) = \delta(rv) - 1 + r * ε(sv) - β * ε(sc) - f / (1 - f) \tag{8}$$

Dependence (8) allows assessing the impact of external and internal conditions, determine alternatives and make decisions about the need and ways of influencing the formation of prices, revenue, cost structure, and capital of an enterprise.

It should be borne in mind that in the process of implementing the chosen alternative, the results of the assessment of factors require clarification, taking into account the difference between the estimated and actual value of the risk.

The proposed approach allows monitoring and analyzing the effectiveness of various alternatives to neutralize enterprise risk.

4. Conclusion

The complexity of the institutional environment, financial relations, and the incompleteness of forecast price information increase the uncertainty of the market conditions for the economic activity of the enterprise. Market uncertainty, as well as the probabilistic nature of achieving the planned goals, trigger negative events associated with the loss of enterprise profits and the occurrence of entrepreneurial risk.

Entrepreneurial risk is associated with the formation of prices for finished products, material, labor costs and capital of an enterprise. An increase in the duration of the technological process, the presence of seasonality, a large number of factors forming the financial results inherent in agricultural enterprises, cause a high level of risk. A high level of activity uncertainty determines the need for measures to assess the risk of the enterprise and its management.
The paper proposes a methodology for assessing the impact of external and internal conditions for the formation of prices, revenue, costs and profits of an enterprise on the level of entrepreneurial risk based on the use of a binary scheme. An analysis of entrepreneurial risk is based on determining the level of risk by which threats can be divided into those requiring management decisions from hazards and threats in which exposure to risk factors is not required.

When the enterprise is in the zone requiring decisions, a method for calculating the critical values of profitability, costs and capital of the enterprise, as well as their structure, is proposed. Assessment of critical values of risk factors allows making decisions and choosing alternatives to affect the level of risk, monitoring and analyzing the effectiveness of measures to neutralize the negative impact of risk on the financial results of the enterprise.

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