Financial risks of sustainable development of small agricultural enterprises assessed to ensure national food security

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Abstract. Assessing, monitoring, and managing the financial risks of small agribusiness enterprises under conditions of economic crisis and sanctions is a complex problem. Despite a state support for agriculture, sustainable development of small and medium-sized entrepreneurship in these periods is complicated by agro-economic risks in addition to growing risks of owner's equity to mitigate the threats to solvency and financial stability, resulting in bankruptcy of small enterprises (SME). The state support mitigates these risks, but the risks do not decrease. Therefore, an important condition for stable and efficient functioning of small agricultural enterprises that considerably contribute to food security and self-sufficiency in Russia is monitoring risks of their financial security, which necessitates methodological approaches to their assessment at the micro level. Despite practical interest of agricultural producers in assessment tools and financial risk management strategies that have a key impact on their overall performance, there is a lack of scientific publications that represent new methods and algorithms for assessing financial risks in agriculture, suitable for practical use by small enterprises. The presented in the article procedure for integrated assessing the total financial risk of sustainable development of small agribusiness enterprises is based on identification and analysis of the risk components and is distinguished by a multifunctional nature and acceptable requirements.

1. Introduction

The 2020 Food Security Doctrine of the Russian Federation determined that sustainable agricultural development is part of the national interests. Under conditions of foreign economic sanctions and the import substitution policy, domestic agricultural producers play a key role in the livelihood of the population and food independence of the state [1]. Their stable functioning considerably influences the entire value chain of an agribusiness product, employment, standard of living of the population, infrastructural development of rural areas, and, therefore, effectiveness of the entire national economy.

One of the factors, constraining the development of the agricultural sector, is the instability of its financial subsystem that needs support at both the macro and micro levels. The study showed that most scientific publications [2-5] and legislative initiatives [6] are devoted to government support measures...
for agribusiness aimed at mitigating management risks, but effective methods for assessing and monitoring financial risks by agricultural producers remain beyond the attention of researchers [7, 8].

2. Goals and objectives
The goal is to develop a procedure for integrated assessing financial risks of sustainable development of small agribusiness enterprises in order to ensure the national food security.

Objectives of the study are to substantiate the role of small enterprises in ensuring national food security; highlight the features and risks of managing small agribusiness enterprises and determine their impact on financial threats to the sustainable development of agricultural enterprises; explore existing methodological approaches and modern methods of risk assessment; develop a qualitatively new procedure for assessing the total financial risk for small agribusiness enterprises based on the identification and analysis of risk components, organizations are exposed to.

3. Methods
General scientific methods of information processing—comparison, analysis, grouping, synthesis, tabular, graphics, as well as special methods of risk assessment, i.e., statistical, calculation, analytical methods, and expert assessment were used in the research.

4. Results and discussion

4.1. Role of small agribusiness enterprises in ensuring national food security.
The national agro-industrial complex has a substantial development potential and shows a positive dynamics in production volumes despite the crisis in the economy (table 1).

| Parameter | 2015    | 2016    | 2017    | 2018    | Overall growth |
|-----------|---------|---------|---------|---------|----------------|
| Agricultural products (in actual prices), billion RUB | 4794.6 | 5112.3 | 5109.5 | 5348.8 | 554.2 |
| incl. agricultural organizations, billion RUB | 2588.6 | 2818.4 | 2818.5 | 3022.1 | 433.5 |
| Proportion of small enterprises in economic output produced by agricultural organizations, % by type of product: |  |
| grain | 36.3 | 37.9 | 40.3 | 37.9 | 1.6 |
| potatoes | 49.4 | 51.3 | 57.6 | 52.6 | 3.2 |
| vegetables | 38.4 | 39.8 | 44.6 | 37.3 | -1.1 |
| milk | 27.4 | 27.9 | 27.9 | 26.7 | -0.7 |

Source: [9].

Statistics shows a continuous increase in agricultural production in 2015-2018, which allowed Russia to maintain a high level of self-sufficiency in basic foodstuffs (in 2018, meat 96%, potatoes 95%, milk 84%, vegetables 87%, and grain 147%).

Agricultural organizations, including small and micro enterprises, mostly contributed to the increase in production. Their share in certain industries ranged from 5.9% (livestock and poultry for slaughter) to 52.6% (potatoes) in 2018. They provided 37.9% of grain. All this testifies to the importance of small agribusiness enterprises in ensuring national food security.

4.2. Features and risks of managing small agribusiness enterprises.
Development of the agro-industrial complex is constrained by many reasons, primarily financial difficulties.

Due to specificity of economic activities, agricultural organizations are subject to diverse risks, i.e., natural and climatic risks of crop loss due to frost, drought, etc.; biological risks (diseases of crops or
animals); restrictions related to regionalization, technical and technological conditions (provision with high-quality equipment, feed, fertilizers, protective equipment, etc.); personnel risks (sufficiency of qualified personnel); operational and technological risks (duration of the operating cycle, features of growing technologies products in crop production and livestock breeding, the need to carry out preparatory pre-sowing work in crop production, forced observance of the crop rotation structure in order to preserve soil fertility, etc.); price risks (fluctuation in prices for agricultural products); and commercial risks (cost excesses market price).

Regardless of the nature of the risks listed, they carry financial threats to the sustainable development of agricultural enterprises and manifest themselves in financial losses or additional financial resources attracted to level them, and certainly affect the financial condition, primarily solvency, financial status, and bankruptcy of agricultural companies (table 2).

Table 2. Financial indicators of agricultural enterprises (OKVED 01 “Crop production, livestock, hunting, and related services”).

| Financial indicator | 2015 | 2016 | 2017 | 2018 | Overall growth |
|---------------------|------|------|------|------|----------------|
| Equity-assets ratio | 0.63 | 0.64 | 0.65 | 0.67 | 0.04           |
| Investment coverage ratios | 0.74 | 0.74 | 0.75 | 0.75 | 0.01           |
| Property mobility rate | 0.57 | 0.58 | 0.57 | 0.57 | 0.00           |
| Working capital financed by equity to total assets ratio | 0.28 | 0.32 | 0.34 | 0.37 | 0.09           |
| Reserve ratio | 0.45 | 0.52 | 0.53 | 0.57 | 0.12           |
| Current ratio | 2.37 | 2.47 | 2.53 | 2.62 | 0.25           |
| Quick ratio | 0.63 | 0.65 | 0.63 | 0.69 | 0.06           |
| Absolute liquidity ratio (solvency) | 0.05 | 0.05 | 0.05 | 0.08 | 0.03           |
| Net profit margin, % | 10.10 | 9.00 | 6.80 | 6.90 | -0.03          |
| Interest coverage ratio | 4.54 | 4.64 | 3.89 | 4.79 | 0.25           |
| Asset turnover, days | 558 | 574 | 623 | 615 | 57             |

Source: https://www.testfirm.ru/otrasli/01/

To rapidly assess the financial status of agribusiness enterprises, we used the Test Firm service on the Audit-it website; its database contains more than 22 thousand agricultural firms of various sizes, which allowed us to judge on the representativeness of the sample indicators. We also note that the table shows median averaged values, which means that half of the firms have financial indexes worse than the median ones.

Despite the positive dynamics of most indicators, the financial status of agricultural enterprises in the reporting period cannot be called satisfactory, because one third of the capital contained attracted repayable funds [10], 25% of them were short-term; non-current assets accounted for more than 40% of the property; and 28-37% of working capital was funded by equity. Major portion of the current assets was illiquid reserves, and liquid assets covered only 63-69% of short-term liabilities. The profitability of net profit was reduced, the duration of one turnover of assets increased, and up to 20% of income covered interest on loans.

Small agribusiness experiences the most acute financial risks. Industry-wide are problems such as shortage of working capital; non-availability of low-cost loans, especially long-term funds, agricultural insurance programs, and state subsidies; a high level of liabilities; and cash gaps due to an illiquid structure of property, a long operating cycle, and a progressive increase in cost [11]. In this regard, developing a new procedure for integrated assessment of financial risks of small agribusiness forms is of great scientific and practical significance.

4.3. Procedure for assessing financial risks of small agricultural enterprises.

There are many different methods for assessing risks. Complex approaches allow obtaining more accurate estimates, but impose high requirements for personnel, information, and technical support of
risk management [12-14]. In this regard, we developed a procedure to assess financial risks of an organization (figure 1). The procedure combines expert and computational analysis tools and allows obtaining sufficiently representative data in the conditions of limited resources and therefore can be applied not only by large enterprises, but also SMEs.

**Figure 1.** Procedure for a stepwise assessment of company’s financial risks.

At the first stage, the financial and business environment of a company is considered. The indicators of its financial stability and profitability are analyzed; the SWOT analysis highlights company’s weaknesses and threats to its financial status. In conclusion, factors that can negatively affect the financial assets of the company are determined and main financial risks of the organization are identified.

The second stage involves assessing the impact of the identified factors on the financial assets of the organization, as well as preliminary assessment of identified risks. To assess the factors, the significance and frequency of financial asset loss due to factors identified are analyzed. Relevant factors are grouped by the related financial risks (table 3).

**Table 3.** Aggregate table of financial risk factors.

| Risk-contributing factor (threat) | Impact on financial assets | Type of financial risk | Average degree of risk factors |
|----------------------------------|---------------------------|------------------------|-------------------------------|
|                                  | Weak (1 point)            | Medium (2 points)      | High (3 points)               |
| -                                | -                         | -                      | -                             |

At the third stage, the risk (table 4) and its potential losses (table 5) are assessed with points for each financial risk identified for the organization.

**Table 4.** Probability score of financial risks.

|    | Probability score                             |
|----|-----------------------------------------------|
| 1  | 0<P<0.1 Risk probability is tending to zero   |
| 2  | 0.1<=P<0.3 Risk probability is extremely low  |
| 3  | 0.3<=P<0.7 Risk will happen with a sufficient indication |
| 4  | 0.7<=P<0.9 Risk will happen with a strong indication |
| 5  | 0.9<=P<=1 Risk is likely to happen             |

The differentiation of that kind allows shifting the emphasis of managing impacts from unlikely risks to the management of “functional” risks that are of high probability.
Table 5. Scoring losses from financial risks implemented

| L_{ri} (points) | Loss severity (L_i) | Situation characteristics |
|-----------------|--------------------|--------------------------|
| 1               | 0% < L <= 5% NP    | Lack or insignificant losses |
| 2               | 5% < L <= 30% NP   | There is a probability of losing part of the net profit |
| 3               | 30% < L <= 70% NP  | Losses will make up most of the profit planned |
| 4               | 70% < L <= 100% NP | Probability of losses, equal to the net profit planned |
| 5               | NP < L <= R         | There is a risk of losses, equal to production costs |
| 6               | R < L <= E          | Losses can affect the organization’s equity and lead to bankruptcy |

where NP is the estimated (planned) net profit of the organization; R is the estimated (planned) revenue of the organization; E is the equity of the organization.

At the next stage, indexes for the identified financial risks are calculated (1) and a financial risk map of the organization is compiled:

\[ I_{r_i} = P_{r_i} \times L_{r_i} \]  

(1)

where \( I_{r_i} \) is the index of the ith financial risk; \( P_{r_i} \) is the score of the risk probability for the ith financial risk; and \( L_{r_i} \) is the score of loss from risk for the ith financial risk.

Based on the expert assessment, a map of the organization’s financial risks is created (figure 2), where the risks are arranged according to the indexes. Characteristics of each zone are presented in table 6.

![Figure 2. Map of company’s financial risks.](image)

Table 6. Zones of financial risk impact on the organization activity.

| Zone | Risk Index (Ir) | Impact on organization activity |
|------|----------------|---------------------------------|
| 1    | 1< Ir_i <=2    | Risk impact on the organization activities is absent or insignificant |
| 2    | 2 < Ir_i <=6   | Weak impact. The company may suffer losses, not exceeding 20%, rarely up to 50% of net profit. |
| 3    | 6 < Ir_i <=12  | Considerable impact. In the vast majority of cases, most of the net profit will be lost. |
4 \quad 12 \leq I_r \leq 20 \quad \text{Strong impact. Lack of profit is expected, the loss probability is high, in some cases it can lead to bankruptcy.}

5 \quad 20 < I_r \leq 30 \quad \text{Inadmissible impact. There is high or complete certainty in loss. Possible termination of activity.}

At the final stage, we assess the total financial risk that characterizes the general financial security of a company (2):

\[ I_r = \sum_{i=1}^{n} I_{r_i} \quad (2) \]

where \( I_r \) is the index of the total financial risk of an organization; and \( I_{r_i} \) is the index of the ith financial risk.

The total financial risk is assessed on the index obtained and degrees proposed (table 7).

| Risk degree | Index of aggregate financial risk | Situation characteristics |
|-------------|------------------------------------|---------------------------|
| Low         | 3 \leq I_r < 18                    | Stable situation. Management is advised to analyze the financial status of the organization in order to study the dynamics of risks and apply preventive measures to reduce them when they increase. |
| Medium      | 18 \leq I_r < 60                   | Increased instability. Management is advised to pay more attention to managing the structure of funding sources for the organization and actively implement measures to reduce current risks. |
| High        | 60 \leq I_r                        | Crisis. High probability of bankruptcy. Management needs to immediately develop and implement comprehensive measures to reduce the risks identified. |

5. Conclusions
The proposed procedure can serve as a basis for developing an optimal policy of funding agricultural enterprises (self-financing, lending, or non-repayable financing), determining the need and feasibility of providing state financial support, assessing financial stability and creditworthiness of agricultural organizations by banks, etc. Taking into account the business conditions and characteristics proposed, the organization’s management will be able to establish limit values for the company’s risk appetite and assess the need and nature of measures to actively manage financial risks.

Unlike complex approaches to risk assessment, the procedure does not require significant amounts of information about the activities of the company or specialized software and hardware and allows a qualitative assessment of financial risks that are strategically important to ensure sustainable long term development.

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