Methodological Aspects of the Analysis and Assessment of the Creditworthiness of Enterprises in Various Areas of the Agro-Industrial Complex and the Practice of Their Application

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Abstract. The agro-industrial complex plays one of the main roles in the economy not only of the Russian Federation, but also of all countries of the world. The standard of living of the population and food security of the country directly depend on the development of the agro-industrial complex and its support by the state. Enterprises of the first and third spheres of the agro-industrial complex in their activities are focused on the development of the second sphere of the agro-industrial complex – agricultural production, which is characterized by natural, technological and economic features. Agricultural production is significantly associated with natural factors, this relationship determined the riskiness of this industry and taking into account the features in all processes of enterprise development and the choice of state regulation mechanisms. The development of agricultural production and related industries is impossible without the attraction of borrowed funds and the formation of specific approaches in the process of financial and credit services. Credit organizations, serving enterprises in this industry, take this factor into account, and provide an opportunity to draw up a convenient schedule for debt repayment.

1. Introduction
To make competent management decisions on the financing of agricultural enterprises, it is important to establish the conditions, factors, volumes, duration of attracting financial resources, credit conditions. For a credit organization, it is important to assess the creditworthiness of customers. The specificity of the agricultural industry, as well as its impact on lending, is associated with the reproduction process, which consists in the discrepancy between the working period and production time due to the natural processes of growth and development of livestock and other agricultural products. Production time exceeds the working period, because of this, resources are unevenly distributed over the year, which leads to seasonality of profits [1].

Performance indicators can be calculated only at the end of the year, which is associated with a rather long production cycle. In this regard, the interpretation of indicators of the financial condition of the enterprise is significantly distorted. During this period, the enterprise is more likely to have a shortage of funds, forcing it to turn to attracting borrowed capital [2].

Credit organizations, serving enterprises in this industry, take this factor into account, and provide an opportunity to draw up a convenient schedule for debt repayment. Agricultural working capital is a long-term turnover, because it is necessary to grow crops and feed livestock. For example, it will take
10–14 months to feed and raise a pig, and 24–27 months to get milk. This feature forces one to attract additional monetary resources in the form of loans and borrowings.

Natural and climatic conditions for this industry are not just a condition, but a factor, the degree of influence of which on the results can be mathematically established. A change in this factor can negatively affect the yield, as well as the fertility and efficiency of livestock.

Agriculture is characterized as an industry with a high risk, since it has a low profitability of products, faces difficulties in selling products, and also does not have the opportunity to use scientific and technological progress to the fullest. Despite this, credit institutions offer their services to this industry [3].

Federal Law no. 264 “On the Development of Agriculture” provides support in the form of available credit resources provided to enterprises engaged in the primary or subsequent processing of agricultural products and their further sale. However, it is worth noting that the state provides such proposals only to organizations and private entrepreneurs, whose income from the sale of the specified (agricultural) products is at least 70% of the total income of the organization. Special support is given to organizations and individual entrepreneurs who take part in federal and regional projects aimed at strengthening the position of regional agricultural producers [4, 5].

Banks create privileges for:
- construction of enterprises for processing raw materials produced in the agriculture of the Russian Federation;
- construction of livestock farms;
- purchase of agricultural equipment;
- loans under the program of the Ministry of Economic Development up to 8.5% for the construction and modernization of agriculture, as well as for participation in agricultural tenders.

2. Problem statement
The agricultural industry has a continuity of the production process, any type of agricultural activity has a clearly defined time frame and cannot be completed earlier or later than the established time. Each stage requires sufficient resources; therefore, efficiency in the process of bank lending is important for agricultural enterprises.

3. Research questions
- The concept of “creditworthiness” of an enterprise in the agro-industrial complex.
- Methods for assessing creditworthiness.
- Approbation of the proposed model for assessing the creditworthiness according to the data of agricultural enterprises.

4. Purpose of the study
The purpose of the scientific article is to consider the main problems of lending and assess the creditworthiness of enterprises in modern conditions on the example of enterprises in various spheres of the agro-industrial complex. Due to the specifics of the industry, a number of difficulties arise in lending to agricultural producers. In this situation, the state is trying to stimulate commercial credit organizations to cooperate with agricultural enterprises, providing them with favorable credit conditions.

5. Research methods
During the study, such research methods were used as comparison, grouping, detailing, analysis of factors of the internal and external environment.
Access to borrowed funds of organizations in the agro-industrial complex is determined by credit institutions. They analyze the specificity of the activity and assess the level of creditworthiness of agricultural producers. Having analyzed some of the definitions of creditworthiness, we will draw up our own definition, which will be advisable to use when studying this issue [6, 7, 8].
Based on the above interpretations, we will compose the most complete definition of creditworthiness. Creditworthiness is the right of enterprises to attract borrowed funds on certain conditions, followed by the obligation to return these funds on time and with a certain interest accrued for their use.

This definition addresses most aspects of creditworthiness, including:

- availability of proper loan collateral;
- financial position of the borrower;
- the presence of specific conditions and characteristics of the enterprise that affect its ability to pay off creditors.

By “specific” conditions we mean the industry-specific features of enterprises, described earlier, which play a significant role in assessing their creditworthiness, especially when it comes to agricultural producers.

When assessing the creditworthiness of a borrower, a number of financial ratios are used that report the financial condition of an organization. The choice of such indicators is determined not only by the credit policy, but also by the characteristics of the bank's clientele, as well as possible reasons for financial difficulties \([9,10]\). Let's present the most well-known methods for assessing creditworthiness:

1. Analysis of absolute indicators, studying accounting data.
2. Analysis of relative indicators, with the help of which the quality coefficients of the balance sheet structure are calculated.
3. Vertical analysis allows one to calculate the proportion of assets and liabilities in the balance sheet currency.
4. Horizontal analysis, with its help, the balance sheet items are studied in dynamics.
5. Trend analysis, which compares specific indicators in dynamics in order to make a forecast.
6. Factor analysis reveals the dependence of creditworthiness indicators on certain factors.
7. Comparative analysis, credit ratios are compared between enterprises, as well as with their standard values.

6. Findings
For a detailed study of this topic, several of the largest enterprises in various fields of the agro-industrial complex of the Novgorod region were selected.

OJSC “Velikonovgorodsky Myasnoy Dvor” is a modern meat processing enterprise, which includes several workshops from slaughter to deep meat processing. The main goal of the organization is the manufacture and sale of meat products (semi-finished products, sausage and canned products).

LLC “Belgrankorm – Veliky Novgorod”. The company specializes in poultry farming, meat processing, dairy farming and crop production in the Novgorod region. The main profit of the company comes from the sale of meat products of its own production, as well as from the breeding and sale of poultry.

LLC “NovSvin” is a closed-cycle pig-breeding complex. The company sells the final products in the form of pork in half carcasses, canned meat and meat semi-finished products.

It is important to note that among the listed organizations, only OJSC “Velikonovgorodsky Myasnoy Dvor” specializes primarily in the processing and sale of agricultural products, thus it belongs to the third sphere of the agro-industrial complex. At the same time, LLC “Belgrankorm – Veliky Novgorod” and LLC “NovSvin” not only sell products in the form of semi-finished products, but also engage in animal husbandry, occupying their niche in two areas of the agro-industrial complex.

Analyzing the financial results of LLC “NovSvin”, it is worth mentioning the events that led to such a result. On September 6, 2019, a death of animals was detected on the territory of the “NovSvin” complex in connection with the detection of the African swine fever virus. By joint efforts, a complex of organizational, economic and veterinary and sanitary measures was organized to eliminate infected objects of African swine fever to prevent further spread of infection in accordance with the Decree of the Governor of the Novgorod region of 07.09.2019, no. 408 “On the establishment of restrictive
measures for African swine fever” and the Decision of the Regional Emergency Anti-Epizootic Commission [11].

For further analysis, the studied ratios are proposed to be divided into two groups: liquidity ratios (table 1) and financial stability ratios (tables 2, 3, 4).

**Table 1.** Indicators of liquidity of the surveyed enterprises.

| Studied enterprises          | 2018  | 2019  | 2020  |
|------------------------------|-------|-------|-------|
| **Overall liquidity ratio**  |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 1.21  | 1.32  | 1.51  |
| LLC “Belgrankorm - Veliky Novgorod”  | 0.81  | 0.92  | 0.92  |
| LLC “NovSvin”                | 2.31  | 0.63  | 1.42  |
| **Absolute liquidity ratio** |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 0.12  | 0.12  | 0.15  |
| LLC “Belgrankorm - Veliky Novgorod”  | 0.04  | 0.06  | 0.01  |
| LLC “NovSvin”                | 0.47  | 0.14  | 0.19  |
| **Current liquidity ratio**  |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 1.21  | 1.37  | 1.59  |
| LLC “Belgrankorm - Veliky Novgorod”  | 1.56  | 2.21  | 1.97  |
| LLC “NovSvin”                | 2.66  | 1.40  | 1.61  |
| **Functioning capital flexibility ratio** |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 5.16  | 3.35  | 2.36  |
| LLC “Belgrankorm - Veliky Novgorod”  | 2.7   | 1.76  | 2.01  |
| LLC “NovSvin”                | 1.32  | 3.17  | 2.35  |
| **Share of working capital in assets** |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 0.77  | 0.81  | 0.79  |
| LLC “Belgrankorm - Veliky Novgorod”  | 0.28  | 0.31  | 0.31  |
| LLC “NovSvin”                | 0.31  | 0.17  | 0.16  |
| **Equity ratio**             |       |       |       |
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 0.17  | 0.22  | 0.31  |
| LLC “Belgrankorm - Veliky Novgorod”  | -0.26 | -0.11 | -0.11 |
| LLC “NovSvin”                | 0.55  | -0.60 | 0.28  |

1. Overall liquidity ratio. The standard value of this coefficient is considered acceptable when it is greater than or equal to 1.

2. Absolute liquidity ratio. The standard value of this ratio is considered acceptable in the range of 0.2-0.7. Since agricultural enterprises have a high risk of failure, then the acceptable value of the coefficient for these enterprises can be considered its minimum limit, namely 0.2.

3. Current liquidity ratio standard value is ≥ 2. The current economic crisis has caused significant damage to agricultural enterprises. Active support from the state at the federal and regional levels can help them get out of this situation. This level of current liquidity is due to a decrease in short-term liabilities of enterprises. Therefore, it is recommended to take the normative value for agriculture to be 1.6, provided that it will be provided with both own funds and subsidies.

4. Functioning capital flexibility ratio. A noticeable growth of the indicator in dynamics at the enterprise “NovSvin” should be considered a negative factor, since this indicates its excessive overstocking.

5. The share of working capital in assets depends on the industry. The high value of the indicator at the enterprise OJSC “Velikonovgorodsky Myasnoy Dvor” is due to the specifics of its activities, because, unlike other analyzed enterprises, it is mainly engaged in the sale of finished products in the form of semi-finished meat products. The indicator is influenced by a significant duration of production. In this regard, the value of 0.5 is a normative one, since the faster the young growth is
raised and fattened, the lower the indicator. The low level of the coefficient for LLC “NovSvin” is most likely explained by the mass extinction of livestock that occurred at the end of 2019.

6. Equity ratio. The standard value of the coefficient is ≥ 0.1. A negative value informs about the formation of circulating assets and non-current assets at the expense of borrowed sources. A similar situation is observed in the crisis year for LLC “NovSvin” in 2019, and the approach of this indicator to the norm for LLC “Belgrankorm – Veliky Novgorod” is a positive trend.

Table 2. Indicators of financial stability of the surveyed enterprises.

| Studied enterprises                          | 2018 | 2019 | 2020 |
|---------------------------------------------|------|------|------|
| Equity concentration ratio                  |      |      |      |
| OJSC “Velikonovgorodsky Myasnoy Dvor”      | 0.36 | 0.37 | 0.45 |
| LLC “Belgrankorm - Veliky Novgorod”        | 0.65 | 0.65 | 0.65 |
| LLC “NovSvin”                              | 0.86 | 0.73 | 0.88 |
| Equity capital flexibility ratio            |      |      |      |
| OJSC “Velikonovgorodsky Myasnoy Dvor”      | 0.37 | 0.59 | 0.65 |
| LLC “Belgrankorm - Veliky Novgorod”        | 0.16 | -0.26| 0.24 |
| LLC “NovSvin”                              | 0.23 | 0.06 | 0.07 |
| Long-term investment structure ratio        |      |      |      |
| OJSC “Velikonovgorodsky Myasnoy Dvor”      | 0.01 | 0.20 | 0.24 |
| LLC “Belgrankorm - Veliky Novgorod”        | 0.24 | 0.30 | 0.28 |
| LLC “NovSvin”                              | 0.03 | 0.18 | 0.02 |
| Debt to equity ratio                        |      |      |      |
| OJSC “Velikonovgorodsky Myasnoy Dvor”      | 1.78 | 1.70 | 1.20 |
| LLC “Belgrankorm - Veliky Novgorod”        | 0.55 | 0.53 | 0.54 |
| LLC “NovSvin”                              | 0.17 | 0.36 | 0.13 |

7. The equity capital concentration ratio shows the proportion of an organization's assets that are covered by equity. Standard value is > 0.5.

8. Equity capital flexibility ratio indicates how mobile own funds are. The standard value of the indicator is ≥ 0.5. It is recommended to reduce the standard value of the coefficient to 0.35.

9. Long-term investment structure coefficient. There is no normative value for the coefficient, but its calculation is still mandatory, since it indicates borrowed funds that finance non-current assets of the enterprise.

10. The ratio of debt and equity funds. The company depends on borrowed funds when the ratio exceeds 1, therefore, when the indicator is lower, the company is sufficiently solvent to pay with its own funds. And the lower this figure, the better.

Also, for a comprehensive analysis, one should consider not only the coefficients, but also full-fledged models that can help assess the likelihood of bankruptcy (table 3, table 4).

Table 3. The Saifullin-Kadykov model.

| Studied enterprises                          | 2018 | 2019 | 2020 |
|---------------------------------------------|------|------|------|
| OJSC “Velikonovgorodsky Myasnoy Dvor”      | 0.99 | 1.07 | 1.26 |
| LLC “Belgrankorm - Veliky Novgorod”        | -0.08| 0.27 | 0.19 |
| LLC “NovSvin”                              | 1.61 | -1.60| 0.21 |

Based on the standards of this model, it follows that the “Velikonovgorodsky Myasnoy Dvor” consistently has a low probability of bankruptcy, while “Belgrankorm”, on the contrary, has a high one. “Novsvin”, in its turn, has an ambiguous situation – in 2018 the probability was low, in 2019 it increased significantly, but by 2020 it began to decline. The presented data confirm the previously
calculated coefficients, however, this model cannot give an accurate estimate, focusing on the average normal values of financial indicators, since these enterprises belong to the agro-industrial complex and have a number of specific features characteristic of the agricultural industry that are not taken into account in the calculations.

Table 4. DuPont's five-factor model.

| Studied enterprises                  | 2018 | 2019 | 2020 |
|--------------------------------------|------|------|------|
| OJSC “Velikonovgorodsky Myasnoy Dvor” | 0.17 | 0.15 | 0.12 |
| LLC “Belgrankorm - Veliky Novgorod”  | 0.16 | 0.15 | 0.11 |
| LLC “NovSvin”                        | 0.12 | -0.38| -0.15|

Analyzing the results of the obtained calculations of the return on equity using the five-factor DuPont model, we can conclude that the data correspond to the previously stated indicators, but are still not accurate enough, since the distinctive feature of the industry is the capital structure of companies operating in it, which is not taken into account when analyzing the results of the model.

Summing up, it should be noted that when assessing the creditworthiness of agricultural organizations, it is advisable to conduct a comprehensive analysis that takes into account the totality of calculated coefficients and models, since individually each of them cannot give an accurate assessment of the sustainability of the financial efficiency of an enterprise.

7. Conclusion
The performed study allows to recommend using the proposed assessment methodology in order to determine the level of creditworthiness of a potential borrower by banks. The general concept assumes a decrease in the lower limit of criterion values by several points when analyzing the level of creditworthiness of commercial banks in connection with the peculiarities of the production sphere of agricultural enterprises.

Since the progressively developed sphere of agriculture has a positive effect on the economy and society as a whole, banks need to:
- expand the scope and improve lending conditions in the agricultural sector;
- carry out ongoing assessments of the efficiency of agricultural enterprises;
- develop new banking services designed specifically for agriculture.

It is important to remember that these recommendations can be implemented primarily through government incentives for credit institutions.

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