PAPER • OPEN ACCESS

Models of assessment of economic viability (insolvency) of organizations as a tool for their adaptation in poultry

View the article online for updates and enhancements.

Models of assessment of economic viability (insolvency) of organizations as a tool for their adaptation in poultry

A G Akopyan and L M Roiter

Federal Scientific Center All-Russian Research and Technological Poultry Institute of Russian   Academy of Sciences, 10, Ptitsegradskaya str., Sergiev Posad, Moscow region, 141311, Russia

E-mail: department.economy.vnitip@yandex.ru

Abstract. Poultry farming is one of the most developed branches of agriculture, as evidenced by the positive dynamics of the main economic indicators, as well as the growth of innovative potential. However, over time, it became obvious that the economic entities of the industry are differentiated in terms of efficiency into solvent and insolvent. This division is measured on the basis of financial condition and the ability to consistently repay its obligations. Previously, the problems of a financial capacity assessment were not of interest to financial analysts. In this regard, a study of the basic models of economic viability (insolvency) was conducted for further use in the industry.

1. Introduction

The strategic goal of the modern world is to provide the population with food, and above all, animal protein. This goal is most successfully implemented by both global and domestic poultry farming, which functions more efficiently relative to other subsectors of livestock.

The competitiveness of the poultry industry is due to a number of factors, including the intensive growth of poultry, a higher yield per unit of area, low feed costs, and a quick return on investment, which integrates its knowledge-intensity as an integrating platform.

The evidence base of the leading positions of the poultry production is the development results, which indicate the positive dynamics of the main technical, economic and financial indicators with increasing its innovative capacity [1].

Thus, the implementation of the National project and the State program for the development of agriculture allowed resulted in increasing egg production by 8.1 bn pcs. for the period from 2006 to 2018, and poultry meat - 3,611K t, i.e. their steady growth can be stated. In the structure of total meat production of all livestock and poultry types, the share of the latter is at 49%. This trend is expected to continue in the near future, in particular, in 2024 it is planned to produce 46.1 bn. eggs and 5,550K t. of meat after slaughter.

At the same time, the analysis shows that poultry organizations are differentiated in terms of efficiency. This is due to the influence of both external and internal factors, the untimely response to which forms loss of profit of the economic entities. To assess the economic viability of poultry enterprises, appropriate methodological tools are needed.

In this regard, the purpose of the study is to systematize the existing methodologies for assessing viability (insolvency), identifying the advantages and disadvantages of each of them and the adaptation of individual elements.

The development of appropriate industry methodology is an important issue for all levels of management.

2. Research results

Currently, the economic viability of an organization is seen from perspective of its financial condition and ability to sustainably pay its obligations.

At the same time, insolvency is considered through indigence of the business entity, and bankruptcy is a legal fact of its insolvency.

Economic sustainability is a combination of quantitative and qualitative characteristics of business processes of an economic entity, ensuring its sustainable functioning and development. The constituent elements of economic viability are: market, industrial, financial, socio-political and environmental sustainability [2].

The success of the implementation of each element of this complex system is largely predetermined by the achieved level of financial viability of the economic entity.

In the economic literature on the problem of building a system for diagnosing the failure of enterprises, first of all, methods of financial analysis are considered [3, 4, 5, 6, 7].

It should be noted that the problem of predicting viability for a long period was not of interest to financial analysts. The unifying link of the existing methods is their focus on the diagnosis and bankruptcy prediction of enterprises.

In this connection, to meet study objectives, various methods of diagnosing and predicting the economic viability (insolvency) of organizations have been systematized within different approaches. Existing methods are differentiated into the following four groups:

- coefficient methods - based on the analysis of quantitative indicators according in financial reporting;
- multivariable models - based on multiplicative discriminant analysis. In these models, the risk of bankruptcy of organizations is measured as a function, which depends on a specific range of variables with the corresponding weighting factors;
- qualitative and analytical methods - based on the assessment of the qualitative parameters of the organization (market position, competitiveness, quality management decisions, etc.);
- other methods. Their main functions are not in the field of prediction or diagnostics of consistency, but in theory they can be used for these purposes.

Each of these methods should be considered in terms of their advantages and disadvantages.

Within the standard-setting base, the development of coefficient models is evident.

According to coefficient models, risks of an enterprise are reflected in shifting the dynamics of generally accepted indicators in financial analysis.

Advantages of coefficient models are:

- the ability to describe many aspects of the business entities;
- easy calculation of criteria.

Disadvantages of coefficient models are:

- differences in the algorithms for calculating the same coefficients;
- their list and composition differ;
- some of the coefficients do not have regulatory restrictions;

- most of the coefficients reflect only changes over time;
- uncertainty in decision-making about the insolvency of the organization if the criteria reflect conflicting results and dynamics;
- the absence of any sectoral distinctions of the analyzed enterprises.

Multivariable models of bankruptcy prediction

In the practice of financial and economic activities of Western companies, Altman Z-score is widely used to assess the bankruptcy. It is a five-factor model, which has a calculation algorithm presented in the equation (1).

$$Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6\,X_4 + 0.999X_5, \tag{1}$$

where X_1 – proportion of working capital;
X_2 – proportion of retained earnings in the corporate assets (asset profitability);
X_3 – profit-sales ratio to the corporate assets;
X_4 – price-earnings ratio of common and preferred shares to the liabilities;
X_5 – sales-ratio to assets.
The assessment of a potential bankruptcy of an enterprise is given on a certain scale based on the Z-values.
Estimates compiled in accordance with this methodology are free from disadvantages specific to coefficient methods:

- the number of criteria used is fixed;
- selection of criteria is carried out through the best distinction between the two groups based on discriminant analysis;
- the calculation of the Z-score does not require significant effort and in accordance with the results gives a 95% match for 1 year in advance.

The multivariable models based fundamentally on econometric methods include Chesser's, Lis's, Beaver's, Taffler's and Tisshaw's models.

The adapted national diagnostic models of possible insolvency should include similar models of the Irkutsk State Economic Academy (ISEA), developed by G. Savitskaya, R. Sayfulin and G. Kadykov, V. Kovalev, O. Zaytsev.

Thus, the four-factor model of potential bankruptcy developed at ISEA has the form presented in the equation (2).

$$Z_\text{п}=8.38X_1+1X_2+0.054X_3+0.64X_4, \tag{2}$$

where $Z_\text{п}$ – functional indicator (final accounts);
X_1 – own working capital / assets;
X_2 – net profit / equity;
X_3 – sales revenue / assets;
X_4 – net profit / manufacturing costs.
This model does not make it possible to accurately predict the insolvency of agricultural enterprises and to differentiate them due to the high proportion of equity (8.38) and small percentage of other indicators (0.5 - 1).

R. Sayfulin and G. Kadykov proposed a model that includes determining the rating number R. This model is presented in the equation (3).

$$R = K_0+0.1\,K_\text{тл}+0.08K_\text{оа}+0.45\,K_\text{м}+1K_\text{пр}, \tag{3}$$

where K_0 – the working capital ratio ($K_0 > 0.1$);
$K_\text{тл}$ – current ratio ($K_\text{тл} > 2$);
$K_\text{оа}$ –advanced capital turnover ratio (sales volume / fixed and current assets) ($K_\text{оа} > 2.5$)

K_M – coefficient of management (profit from sales / (revenue from sales) ($K_M > 0.445$);

$K_{пр}$ – viability of equity (gross profit / equity) ($K_{пр} > 0.2$).

The most common indicators characterizing the financial viability of an economic entity in the multivariable models of possible bankruptcy are amount of working capital, capital productivity, asset profitability, core activities and equity.

The unifying problem of coefficient and multivariable methodologies is the absence of quality indicators. These models do not take into account the dynamics of changes in the organization's performance over time, and, therefore, do not contain information about the development trends of the business entity.

Qualitative-analytical methods

The formalized method of the decision-making process is the A-score (also referred as Argenti-model), which identifies seventeen factors that characterize the organization's position from a qualitative point of view.

There are three types of problems associated with incorrect management decisions that will later lead the organization to bankruptcy - weaknesses, mistakes, symptoms. Based on a total formed, the company belongs to one of the groups: low risk (up to 25 points), medium risk (from 25 to 34 points, bankruptcy over 5 years), high risk (over 34 points).

The disadvantage of this model is the high degree of subjectivity of the assigned estimates.

Other methods of assessing viability include a model for estimating the generated value added (EVA, SVA, EBO), business profitability, as an indicator of asset management quality (ROA, ROE, stock returns), cost-volume-profit analysis (CVP-analysis), and others.

These techniques do not assess the risks to the organization that may arise in the future. Therefore, they cannot give a qualitative characteristic of viability.

Systematization, comparative characteristics of existing methods of assessing the economic viability (insolvency), diagnosis and prediction of bankruptcy led to the following conclusions:

- Diagnostic models based on predicting the probability of bankruptcy make it possible to establish the fact that the probability of bankruptcy of organizations. However, they do not provide an opportunity to determine the trends of their further development.
- In these models, bankruptcy prediction is based on comparing the dynamics of indicators of the financial condition of enterprises. This approach does not allow evaluating their qualitative nature. For example, high profitability at an insufficient pace of enterprise development requires adjustments to the needs of additional funding and vice versa.
- Most models are focused on identifying the primary factors of insolvency and their generalized assessment.
- Qualitative models do not have a common integral index. At the same time, these models enable to implement additional specific indicators for the instability development.

Analytics of the above models indicates the absence of systemic diagnosis of insolvency. There are only scattered elements based on the use of various methods of financial analysis for the static state of the enterprise or models of bankruptcy prediction and evaluation of their results.

Thus, at the present stage there is no single model for assessing the economic viability (insolvency) of agricultural enterprises, which could fully meet the requirements of consistency and complexity, as well as efficiency and effectiveness.

Based on the analysis of the advantages and disadvantages of the existing models, progressive implementation for assessment methodologies of the economic viability (insolvency) of business entities in relation to the poultry industry is proposed. It is fragmentarily presented in the table 1 without detailing the algorithms for the implementation of each stage.

Table 1. Progressive implementation for assessment methodologies of the economic viability of enterprises.

Stage name	Characteristic
1. Targeting	Formation of the so-called. "target tree", i.e. consistent decomposition of the main goal on the sub-goals
2. Choosing the scale of the assessment procedure	Objects of assessment can be either the entire set of organizations or individual groups of a particular form of ownership.
3. Identification and establishment of regulatory evaluation criteria	A scheme was developed for the implementation of valuation procedures according to the selected regulatory criteria, namely the "net asset value". In this case, the analysis of the dynamics of changes in the value of net assets is carried out, then a comparative analysis of the value of net assets and the authorized capital, followed by an analysis of economic viability (insolvency).
4. Identification of a set of private indicators for assessing	To implement an objective assessment, 4 sets of indicators were identified - identification of viability and liquidity, business activity, financial stability, and investment activity. An assessment is also made of the cumulative influence of factors of the internal and external environment of activity on the state of enterprises according to the developed matrix
5. Development of a grading scale for assessing the level of economic viability	5. Development of a grading scale for assessing the level of economic viability

As a result of the study, 4 levels of economic viability were identified, namely:

- absolute economic viability;
- normal economic viability;
- conditional economic viability;
- conditional economic failure.

At the same time, among the important problems of studying this problem is the formation of a database of normative values of particular indicators for the assessment of economic viability. The implementation of this issue will be carried out through setting up the regression models.

3. Conclusion

Against the background of the positive dynamics of the production and consumption of poultry products in the whole industry, there is a differentiation of its economic entities in terms of viability (insolvency). Among the factors that form the negative dynamics of financial results are the dominant factors such as inflation, exchange rates, reduced viability of the population, increasing debt load of one rouble of equity, reducing availability of liabilities with own property, increase in the share of stocks in the structure of current assets, disparity of prices for consumed resources and sold poultry products, imbalance of investment funds, which are mainly concentrated among large producers, high dependence on the import of breeding products, as well as the imperfection of the state regulation mechanisms for the effective functioning of the poultry product sub-complex.

To identify and graduate poultry enterprises according to their level of viability (insolvency), a methodological basis for this kind of assessment has been developed with the adaptation of individual progressive elements of existing foreign and national methods. Its use in the industry will make it possible to predict the economic viability of poultry enterprises, to identify the causes of insolvency and to take timely management decisions to neutralize these causes.

References

[1]   Burova D A 2018 The main problems of innovative development of poultry farming. *Int.Scient.Conf.of young scientists and specialists,dedicated to the 150ᵗʰ anniversary of the birth of V P Goryachkin* 414-18

[2]   Zarudnev A I and Merzlikina G S 2015 Modern approaches to managing the economic viability of an economic entity. *News of VolgSTU* **3** 91-9

[3]   Badanov A N Kusakina O N and Korablin N V 2007 Seasonal indicators of the financial condition of agricultural enterprises. *Economics of agricultural and processing enterprises* **10** 58-60

[4]   Blank I A 2001 Anticrisis financial management of an enterprise. (Kiev, Elga, Nika-center) p 528

[5]   Kazakov M P, Pankova K I and Maslennikova V F 2002 On the financial rehabilitation of agricultural enterprises. *Economics of agricultural and processing enterprises* **39**. 32-5

[6]   Makarov A s and Mizikovskiy E A 1996 On the problem of choosing criteria for analyzing the viability. *Accounting* **3** 19-21

[7]   Panasyuk M V 2008 Economic viability as a factor of economic security of an enterprise. *Newsletter of TGGPU* **3(14)** 59-63