

# Optimization of Information Analytical Support for Assessing the Reliability of Counterparties from the Standpoint of Economic Security

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**Abstract** – To solve the problem of finding effective methodological approaches that would make it possible to determine the level of security of relations with market entities with a high degree of reliability, it is proposed to use a comprehensive methodology for assessing the economic reliability of counterparties. As a result of the application of the methodology, an optimal configuration of information analytical support for assessing the economic reliability of counterparties is formed, based on a combination of financial diagnostics techniques with special methods for checking the reliability of data and involves modeling the levels of economic reliability of counterparties, depending on the achieved value of the integral indicator of economic reliability for: counterparties with high level of reliability, sufficient level, low level of reliability and unreliable counterparties.

**Keywords** – economic security, modeling of security conditions, financial diagnostics, analytical models, financial ratios, reliability of information.

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## 1. Introduction

One of the main features of the enterprise economic security is its reliability, which is understood as the ability to maintain the basic parameters of financial and economic activity, regardless the action of external and internal factors.

An enterprise is characterized by a high level of reliability if it sells competitive products for a long time, makes a profit sufficient for industrial and social development, is creditworthy, and its financial relations with other business entities guarantee stability, financial and commercial success. The assessment of the economic reliability of an enterprise is especially relevant in the context of identifying threats associated with an unfair partnership. After all, among the surveyed Ukrainian enterprises that have suffered from unscrupulous partnerships, 43% regularly face fraud in the field of relations with customers (buyers), and 28% suffer from unscrupulous behavior of intermediaries and suppliers [12]. The issue of assessing the economic reliability of counterparties has been repeatedly raised in the works of well-known domestic and foreign economists, who in order to diagnose threats of unfair partnership proposed to use the methodology for assessing the competitiveness of an enterprise [6], the method for assessing the reliability of the financial condition of an enterprise [10], or the method for scoring the creditworthiness of an enterprise [3], [16]. A significant number of scientists were engaged in the study of the economic security system, for example: [8], [11], [14] and other. Estimation in economic security science on the basis of game theory allows determining the point (points) of maximum balancing of the interests of each participant (in the form of extremes of the amounts of assessments of the interests of each game participant) [13], [15]. The

approaches based on the assessment of the probability of bankruptcy include [1], [2], [5]. Despite the clearly incomplete studies of approaches to evaluation in economic security science, the content of these approaches, their advantages and limitations have already received a fairly detailed description for example: [4], [7], [9]. In general, agreeing with the logic of these considerations, we want to emphasize a certain unsuitability of these methods to the needs of economic security. First of all, this is due to the low reliability of the basic data used as an information platform for carrying out diagnostic procedures and the imperfection of the criteria for assessing the financial condition of the counterparty when diagnosing the reliability or unreliability of economic relations with it. To overcome these shortcomings, a comprehensive methodology for assessing the economic reliability of counterparties is proposed, based on a combination of financial diagnostics techniques with special methods for verifying the reliability of data presented in the counterparty's reporting, and provides for ranking the objects of verification, depending on the value of the integral indicator of economic reliability achieved by them, for: counterparties with high level of reliability; sufficient level; low level of reliability and unreliable counterparties.

## 2. Research Method

The introduction of a comprehensive methodology for assessing economic reliability as a basic model for rating assessment of counterparties, cooperation with which will not be accompanied by significant threats, requires specialists in the field of economic security to perform the following actions:

Step 1. Outlining directions for the implementation of the ratio analysis of the components of the financial condition of the object of inspection. The broadest idea of the financial condition of an enterprise is provided by an assessment of its solvency, financial independence (stability), efficiency of activities and business activity. In particular, the solvency assessment provides an idea of an enterprise ability to pay its obligations in accordance with established terms or contractual terms. To ensure the reliability of conclusions about the state of the enterprise's solvency, the analyzed period should be at least one year, or one operating cycle. The assessment of financial stability gives an idea of the degree of dependence of an enterprise on investors and creditors' influence on its current activities. Consequently, the state of financial stability of economically reliable partners is characterized, first of all, by a high share of equity capital in the assets financing. Assessing the profitability and business activity of an enterprise

provides an idea of the effectiveness of its financial and economic activities and the effectiveness of management in managing existing assets.

Step 2. Forming a list of key ratios that will provide a comprehensive view of the financial condition of an enterprise. The composition and number of ratios is chosen at the discretion of the security specialist, who is responsible for the accuracy of the conclusion about the state of economic reliability of the counterparty. In this case, the main requirement for the choice of indicators should be the transparency (unambiguity) of their calculation, high analyticity and information content. To avoid distorting the conclusions about the state of economic reliability, the number of these indicators should not exceed 3-4 ratios within each direction of the assessment.

Given these limitations, it is recommended to assess the economic reliability of economic entities to use the list of financial ratios provided in table 1.

Step 3. Determining the priority of the impact of groups of financial ratios on the result of assessing the reliability of cooperation with individual groups of partners. To do this, the significance of individual groups of financial ratios is established by an expert method so that the total value of the specific weights is 1. That is:

$$\sum X_j = 1, j = 1 \dots n \quad (1),$$

where  $X_j$  – specific weight of a particular group of financial ratios,

$j$  – corresponding group of financial ratios,

$n$  – number of groups of financial ratios.

Step 4 – Establishing priority within certain groups of financial ratios according to the rules of correlation analysis. Using the correlation ratio, the intensity of the relationship between numbers of dynamics of the results of the enterprise activity with the series of dynamics of its key indicators is determined.

The obtained correlation ratios are divided by the sum of their values for a separate group so that the correspondence is preserved:

$$\sum w_{ij} = 1 \quad (2),$$

where  $w_{ij}$  – specific weight of  $i$ -th ratio in the composition of  $j$ -th group.

The values  $w_{ij}$  are defined in this way and will act as weight values of the impact of individual factors on the result of assessing the economic reliability of an enterprise. As an alternative to correlation analysis, to establish the weights of the influence of individual ratios on the financial result of the counterparty when determining economic reliability, experts of the economic security service can use expert estimates.

Step 5. Substantiating reference values of indicators with which actual data are compared at the estimation of economic reliability of the economic entity.

For this, experts in the field of economic security can apply one of the approaches: at the level of standard values of individual financial ratios; at the level of average industry data for enterprises of certain types of activity, which include the investigated

counterparties; at the level of benchmarking results for groups of homogeneous enterprises that need the same managerial decision on cooperation with them, at the data level at the beginning of the analyzed period.

Table 1. Conditional list of financial ratios used to assess the economic reliability of economic entities

Indicator	Function
Ratios used to assess the solvency of an entity	
1. Debt-Service Coverage Ratio ( <i>DSCR</i> )	Characterizes the ability of a company to repay its current liabilities with cash received from operating activities. The threat of loss of solvency is evidenced by the fall in the ratio in the dynamics
2. Ratio of Receivables To Payables ( <i>RRP</i> )	Characterizes the level of potential solvency of an enterprise and determines the effectiveness of cash flow management. The decline in the dynamics is a positive trend and indicates an increase in the level of solvency
3. Current Ratio ( <i>CR</i> )	Characterizes the sufficiency of current assets of a company to repay current liabilities during the reporting period. The downward trend indicates an increase in the threat of loss of solvency
4. Current Assets to Equity Ratio ( <i>CAER</i> )	Characterizes the share of current assets of an enterprise, financed by equity. The decrease in the share of equity in current assets indicates a threat of declining solvency of an entity
Ratios used to assess the financial stability of an entity	
1. Financial Risk Ratio ( <i>FRR</i> )	Shows how many monetary units in the liabilities per unit of counterparty's own funds. An increase in the ratio in the dynamics indicates the risk of losing the financial independence of an entity
2. Investment Ratio ( <i>IR</i> )	Shows how much of the company's non-current assets are provided with sustainable (long-term) sources of funding. The fall in the ratio in the dynamics indicates a loss of investment attractiveness of an entity
3. Equity-to-Asset Ratio ( <i>EAR</i> )	Determines the share of business owners in the total amount of funds advanced to its activities. The downward trend in the indicator indicates an increasing threat of losing its financial autonomy
4. Financial Stability Ratio ( <i>FSR</i> )	Shows how many hryvnias of own and equivalent funds accounted for each hryvnia borrowed. The fall in the ratio in the dynamics indicates an inefficient capital structure
Ratios used to assess the performance of an entity	
1. Return on Assets ( <i>RA</i> )	Determines the share of net income in the amount invested in capital assets. The growth of the indicator in the dynamics indicates the absence of the threat of inefficient use of the involved assets
2. Return on Sales ( <i>RS</i> )	Determines the effectiveness of an enterprise in the market from the standpoint of quality cost management and pricing policy. The growth of the indicator in the dynamics indicates an increase in the competitiveness of the entity
3. Return on Equity ( <i>RE</i> )	Shows the economic effect of using equity. The growth of the indicator in the dynamics indicates an increase in the effect of the use of equity
Indicators used to assess a turnover of individual factors of an entity	
1. Receivables Turnover Ratio ( <i>RTR</i> )	Shows how many times the income from sales exceeds the average annual value of trade receivables. The decline in the dynamics indicates an increase in the period of stay of cash in the state of receivables
2. Accounts Payable Turnover Ratio ( <i>APTR</i> )	Shows how many times the cost of sales exceeds the average annual value of trade payables. The growth of the indicator in the dynamics indicates a reduction in the period of deferred payment that an entity may receive from suppliers, which is a negative trend
3. Inventory Turnover Ratio ( <i>ITR</i> )	Shows how many times the funds invested in material resources are covered in the cost of goods sold. The decline in the dynamics indicates a threat of diversion of financial resources into illiquid stocks
4. Asset Turnover Ratio ( <i>ATR</i> )	Shows how many hryvnias of income from sales per one hryvnia of funds invested in the assets of an enterprise. The downward trend indicates the threat of inefficient management of an entity's available assets

Taking into account a certain imperfection of each approach, we believe that the most reasonable and easy method to use will be the establishment of benchmarks at the level of the achieved values of

financial ratios at the beginning of the period. According to this approach, the security specialist has the opportunity not only to test the indicators at the beginning and end of the analyzed period for their

compliance with the normative values, but also to trace the dynamics of changes in these indicators and establish the reasons that led to a decrease in the economic reliability of the enterprise.

Step 6. Establishing the correspondence of actual indicators to their reference value. For this, the actually achieved value of the corresponding financial indicator is divided by its reference value using the formula:

$$y_{ij} = q_{ij} \div q_{ij}^* \quad (3),$$

where  $i$  – separate indicator that belongs to a certain group  $i = 1 \dots r$ ,

$y_{ij}$  – ratio of the actual and reference value of the corresponding financial indicator,

$q_{ij}$  – actual value of  $i$ -th indicator of  $j$ -th group,

$q_{ij}^*$  – reference value of  $i$ -th indicator of  $j$ -th group,

$r$  – number of indicators included in a group.

If the actual value of the indicator exceeds the reference, the ratio between them will exceed 1, which is a positive trend and indicates an increase in the level of economic reliability. And vice versa, all indicators that should be traced to growth in the dynamics, and which have not reached the reference value, have a negative impact on the overall financial result of an enterprise, and thus reduce its economic reliability.

And for indicators whose growth in dynamics is a negative trend, the ratio is calculated with the inverse formula, that is, the standard is divided by the actual value of the indicator. In this case, the result below 1 indicates the positive impact of the corresponding financial ratio on the state of economic reliability of an enterprise.

Step 7. Calculating partial indicators for assessing economic reliability for a separate group of financial ratios as the weighted average sum of products, the ratio of the actual and reference values of the corresponding financial coefficient ( $y_{ij}$ ) to the share of its impact ( $w_{ij}$ ) in the corresponding group of financial indicators. This uses the formula:

$$G_j = \sum y_{ij} \times w_{ij} \quad (4),$$

where  $G_j$  – partial indicator of the assessment of the impact of a particular group of financial ratios on the state of economic reliability of a counterparty.

Thus, four partial indicators for assessing economic reliability are determined, caused by the impact of the actually achieved level of solvency, financial stability, profitability and efficiency of an enterprise.

Step 8. Actual verification of alternative sources of information about the activities of the enterprise with the assignment of information provided in the financial statements, and the reliability ratio ( $R$ ) is included.

Obtaining negative information on at least one of the listed items, even with high financial indicators, is enough to recommend the company's management to refuse to cooperate or take cautious actions when interacting with such counterparty.

Step 9. Calculating the integral indicator for assessing the economic reliability of an enterprise by multiplying the total value of private indicators for assessing economic reliability for each group of financial ratios by the reliability ratio of financial information using the formula:

$$I = (\sum G_j \times X_j) \times R \quad (5),$$

where  $I$  – integrated indicator of a comprehensive assessment of the economic reliability of counterparty,

$G_j$  – partial indicators for assessing the impact of a particular group of financial ratios on the state of economic reliability of a counterparty,

$X_j$  – specific weight of the significance of a separate group of financial ratios when making appropriate management decisions regarding cooperation with a counterparty,

$R$  – reliability ratio of the information provided in a reporting.

Thus, the integral indicator of a comprehensive assessment of the economic reliability of counterparty on the one hand, makes it possible to assess the impact of individual financial indicators on the result of assessing the economic reliability of an enterprise, and on the other hand, it determines the reliability of this assessment.

Step 10. Determinating the level of economic reliability of an enterprise in accordance with the scale of interpretation of the achieved value of the integral assessment indicator ( $I$ ), which is presented in Table 2.

Table 2. The scale of interpretation of the integral indicator for assessing the economic reliability of an enterprise

The range of values of the integral assessment indicator (I)	The level of economic reliability of an enterprise
below 0,5	The cooperation with an entity is <i>not economically sound</i>
0,5 - 0,89	The level of economic reliability of an entity is <i>low</i>
0,9 - 1,0	The level of economic reliability of an entity is <i>sufficient</i>
above 1,0	The level of economic reliability of an entity is <i>high</i>

### 3. Results

The proposed technique was tested at one of the largest agricultural enterprises in Ukraine - OptimusAgro Trade LLC, which is one of the TOP-5 producers of unrefined sunflower oil in Ukraine. The practical implementation of methodological developments was carried out in three stages.

So, at the preparatory stage, a system of information sources was formed, directions for diagnosing the financial condition of the Company were determined and the composition of financial ratios that determine the level of economic reliability were justified. The main sources of financial information that were used as an information basis for calculating financial ratios were the Balance Sheet (Statement of Financial Condition) and Statement of Financial Results

(Statement of Comprehensive Income).

Alternative sources of information that are publicly available were used to verify the accuracy of the data reported. It is established that the Company often re-registers its activities, changes owners and has a low share of authorized capital (0.01%) in the structure of sources of asset financing. This significantly reduces the level of confidence in the reliability of financial data reflected in the Company's financial statements. Therefore, the reliability ratio of financial information (K) is 0.7.

The analytical stage involved direct analytical procedures to determine the integrated indicator of assessing the economic reliability of OptimusAgro Trade LLC. The results of the analytical evaluation are presented in Table 3.

Table 3. Assessment of economic reliability of OptimusAgro Trade LLC in 2019

Indicator	Reference (beginning of 2019)	Fact (end of 2019)	Deviation	Weight value of influence on the state of reliability	Corrected deviation
1	2	3	4 = 3÷2 or 4 = 2÷3	5	6 = 4 x 5
Ratios used to assess the solvency of the Company					
1. Debt-Service Coverage Ratio ( <i>DSCR</i> )	-0,2	0,22	1,1	0,08	0,088
2. Ratio of Receivables to Payables ( <i>RRP</i> )	0,53	0,47	1,1	0,08	0,088
3. Current Ratio ( <i>CR</i> )	1,6	1,0	0,6	0,05	0,03
4. Current Assets to Equity Ratio ( <i>CAER</i> )	0,2	0,03	0,2	0,04	0,008
<i>Partial indicator</i> of the influence of solvency on the state of economic reliability of the Company ( <i>Gsol</i> )	X	X	X	0,25	∑ 0,214
Ratios used to assess the financial stability of the Company					
1. Financial Risk Ratio ( <i>FRR</i> )	1410,9	536,2	2,63	0,1	0,263
2. Investment Ratio ( <i>IR</i> )	0,0007	0,002	2,86	0,07	0,2
3. Equity-to-Asset Ratio ( <i>EAR</i> )	44,2	1,79	0,04	0,04	0,002
4. Financial Stability Ratio ( <i>FSR</i> )	0,22	0,06	0,3	0,04	0,012
<i>Partial indicator</i> of the influence of financial stability on the state of economic reliability of the Company ( <i>Gfs</i> )	X	X	X	0,25	∑ 0,477
Ratios used to assess the performance of the Company					
1. Return on Assets ( <i>RA</i> )	0,0006	0,001	1,67	0,1	0,167
2. Return on Sales ( <i>RS</i> )	0,0004	0,0008	2,0	0,1	0,2
3. Return on Equity ( <i>RE</i> )	0,79	0,67	0,85	0,05	0,043
<i>Partial indicator</i> of the impact of efficiency on the state of economic reliability of the Company ( <i>Gef</i> )	X	X	X	0,25	∑ 0,41
Indicators used to assess a turnover of individual factors of the Company					
1. Receivables Turnover Ratio ( <i>RTR</i> )	4,3	4,4	1,02	0,08	0,08
2. Accounts Payable Turnover Ratio ( <i>APTR</i> )	2,2	1,99	1,1	0,08	0,088
3. Inventory Turnover Ratio ( <i>ITR</i> )	4,3	4,8	1,1	0,06	0,066
4. Asset Turnover Ratio ( <i>ATR</i> )	1,47	1,53	1,0	0,03	0,03
<i>Partial indicator</i> of the influence of the turnover of the Company's activity factors on the state of economic reliability ( <i>Gt</i> )	X	X	X	0,25	∑ 0,264
Financial information reliability ratio (K)	0,7				
Integral indicator for assessing the economic reliability of the Company ( <i>I</i> )	$(0,214 + 0,477 + 0,41 + 0,264) \times 0,7 = 0,96$				

The analysis results presented in Table 2 indicate that there is a positive trend in most of the indicators presented. Instead, the current ratio and the investment ratio decreased significantly, which indicates a decline in solvency and loss of investment attractiveness of OptimusAgro Trade LLC and, as a result, reduces its level of economic reliability.

At the final (evaluating) stage, the level of economic reliability of the Company was determined. According to the interpretation scale, the studied enterprise in 2019 has a sufficient level of economic reliability, characterizing it as a partner, cooperation with which will be safe for counterparties.

#### 4. Conclusions

The developed and tested scientific methodological approach to assessing the state of economic reliability of economic entities allows to identify the following advantages in comparison with other methodological approaches in this area of research, namely:

- a) simplicity and convenience of calculations based on the proposed system of indicators;
- b) possibility of forming a dynamic indicator of integrated assessment of economic reliability;
- c) high degree of reliability of the results obtained, since the basic data are checked by special security methods;
- d) variability of the number of indicators and the possibility of changing the period of diagnosis, which makes a comprehensive methodology for assessing economic reliability most suitable for solving specific problems in the system of economic security of domestic enterprises.

The use of the proposed assessment methodology in the practical activities of domestic enterprises will ensure the implementation of a multi-level systemic monitoring of economic relations with counterparties. At the same time, the formalization of the assessment process, on the one hand, will allow the correct use of analytical techniques and enhance the reliability of the results obtained, and on the other hand, it will reduce the subjectivity of economic security specialists when they make decisions about the expediency of working with contractors.

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