

# Development of a Methodology for Assessing the Economic Security of Oil and Gas Companies

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## ABSTRACT

The economic security of an enterprise is a complex multicomponent phenomenon, the study of which is necessary for a comprehensive, systematic assessment of the stability of an enterprise, in particular oil and gas one, to the effects of external and internal environmental factors. The modern practice of analyzing this phenomenon most often involves only analyzing the consequences of already realized risks, without factor analysis of the previous state of the system. In this regard, the article describes the following research results: based on the study of existing definitions, the author's definition of the economic security of an enterprise was formulated to clarify the boundaries of the research subject; a set of indicators for assessing the economic security of an oil and gas enterprise was formed; a methodology for assessing the economic security of an oil and gas industry enterprise has been developed and tested, including a comprehensive assessment of the level of economic protection of an enterprise  $LES_i$ , and its gradation: sufficient, acceptable, unacceptable.

**Keywords:** *economic security, oil and gas company, level of economic protection against threats; methodology.*

## 1. INTRODUCTION

The formation and effective functioning of the oil and gas industry, as one of the basic elements of the economy, is possible with a clearly developed set of measures aimed at improving the economic risk management system. To do this, it is necessary to develop a methodology (algorithm, indicators) for a comprehensive and systematic assessment of the relationship between risks and their impact on economic processes.

The existing theoretical approaches and methods of risk assessment do not provide for an exhaustive, comprehensive and systematic assessment of the relationship of risks and their impact on economic processes occurring at the enterprise, but only allow an analysis of the consequences of the manifestation of individual, often disparate risks. There is an urgent need to solve this problem.

The process of finding a trade-off to balance the benefits of risk mitigation and the costs involved, and deciding what action to take to do this (including not

doing anything) is called risk management. In connection with the stated purpose of the study was the development of a methodology for assessing the economic security of an oil and gas industry. To achieve this goal, the following tasks were solved:

- clarification of the concept of "economic security" in relation to the oil and gas sector enterprise;
- formation of a set of indicators for assessing the economic security of an oil and gas enterprise;
- development of a methodology for assessing the economic security of an oil and gas enterprise.
- approbation of the methodology on the example of an oil and gas company.

## 2. MATERIALS AND METHODS

The empirical basis of this study was made up of materials, personnel records of an oil and gas company, statistical data and analytical materials of the enterprise, materials published in scientific monographs and periodicals. The objectives of the study were achieved

through the use of expert assessment methods, multi-criteria optimization, system analysis method, multidimensional statistical analysis, fuzzy logic method, indicative method.

### 3. RESULTS AND DISCUSSION

Risk management of an oil and gas company involves the implementation of several classification of risks, their identification, analysis and assessment of risks, and the development of possible alternative measures to protect against risk; Such activities can pursue as their goal the localization, prevention, avoidance and elimination of the consequences of the implementation of various risks. For an oil and gas enterprise, two groups of risks can be distinguished: general risks of a commercial enterprise and specific industry risks.

The last category includes such risks as: the risk of unjustified results of expenditures on geological exploration; risks associated with erroneous or inaccurate results of geological exploration, which will cause significant losses; changes in the market conditions for raw materials and materials and petroleum products; project risks, in particular those related to personnel, their qualifications; the possibility of emergencies of an anthropogenic and natural-climatic nature.

The complexity and multicomponent nature of the activities of an oil and gas enterprise determines in the implementation of its activities the whole range of common, traditional risks - from socio-political to inflationary and liquidity risks.

Analysis of the impact of risks on the nature of oil activities and the process of forming threats in combination with new opportunities that can be used to increase the level of competitiveness of firms are presented in the works of such scientists as A.G. Badalova, U. Bek, S.N. Vorobiev, Dolgodush A.I., Eliseeva M.A., Zubova L.V., Ioda E.V., Liu Ch., Night F.Kh., Pokrovsky A.M., Falin G.I., Shvets S.K. , Yuldashev R.T. et al [1-11].

Mechanisms for improving the risk management process of oil and gas producing companies and tools that allow effectively embedding their common management system are considered in the publications of Baldin K.V., Bezdenezhnykh V.M., Bernstein P., Brega G.V., Volkova M.V., Zabirova L.M., Zaripova R.Ya., Kostina R.S., Makhyanova M.A., Nekrylova N.V. and others [12-21].

To clarify the essence of the research subject, based on the analysis of existing interpretations (V.L. Tambovtsev, L.I. Abalkin, S.A. Afontsev, B.A.

Raizberg, N.V. Matveev, E.A. P. Gradov, O. V. Klimochkin, V. V. Shlykov, V. P. Mak-Mak) [12-24], the author's definition of economic security was formulated - the state of the internal environment of the enterprise, characterized by the ability to consistently ensure the compliance of the enterprise's activities with regulatory and legislative requirements, in such elements as financial, production-technical and social, in conditions of dangers and opportunities of a changeable external environment.

At the same time, the economic security of an enterprise is a set of elements that make it possible to define it as a volumetric area of activity to ensure the comprehensive security (security) of an enterprise.

In the course of the study, the authors developed an algorithm for assessing the economic security of an oil and gas producing company, which includes the following stages:

1. Determination of the structural elements of the economic security of the oil company.
2. Identification and zoning of potential threats to the economic security of an oil company.
3. Assessment of the level of economic security of an oil company
4. The choice of a method for managing threats to the economic security of an oil company.

The developed algorithm was applied to the activities of an oil and gas company.

At the first stage, the elements of the economic security of the enterprise were identified: information security, personnel security, legal security, environmental security, engineering and technical security, physical security; financial security.

At the second stage, three levels of economic security were identified: sufficient, acceptable, and unacceptable.

In the first case, no measures (with the exception of preventive measures) are required to improve the economic security of the enterprise.

In the second and third cases, an analysis of the situation is required, with the elaboration of the factors that led to this situation and are capable of significantly changing it (aggravating or improving).

The third step involved the selection of indicators that would comprehensively and systematically describe the economic security of the oil company; the metrics should allow the rating to be carried out over a number of periods.

**Table 1.** Characteristics of the levels of economic security (LES).

Complex indicator level	Description Indicator	Values, unit fractions	Recommended measures
LES <sub>1</sub>	Adequate level of economic security, i.e. at the moment the oil company is able to protect itself from external and internal threats -	0.8-1.0	Development of a strategy of economic security and a set of measures for the prevention and prevention of threats.
LES <sub>2</sub>	Acceptable level, i.e., it is necessary to carry out additional measures to increase the level of protection against external and internal economic threats	0.5-0.8	Analysis of the implemented strategies and measures for risk management of the company and supplement the existing set with more effective methods
LES <sub>3</sub>	Unacceptable level of protection against threats, i.e. urgent measures are needed to strengthen the economic security of the enterprise	0-0.5	A fundamental change in the strategy of protection against economic threats, the development of urgent measures to increase the level of economic security

**Table 2.** Assessment of the level of ensuring the economic security of an oil company (financial element - F).

Index	Forecasted value of the indicator			Actual values 2019	d *	Integral indicator F
	LES <sub>1</sub>	LES <sub>2</sub>	LES <sub>3</sub>			
Current liquidity ratio	> 2	1-2	<1	0.45	0.18	0.52
Absolute liquidity ratio	> 0.2	0.1-0.2	<0.1	0.69	1.97	
Autonomy ratio	> 0.6	0.5-0.6	<0.5	0.64	0.13	
Return on assets,%	> 15	10-15	<10	-2.51	0.50	
Return on sales,%	> 20	15-20	<15	-5.2	0.58	
Profit growth rate,%	> 10	5-10	<5	-145	10.03	
EBITDA margin,%	> 15	10-15	<10	-3.74	0.55	
Growth rate of the receivables turnover ratio,%	> 5	2-5	<2	0.64	0.19	
Equity / debt ratio	<0.5	0.5-0.7	> 0.7	0.45	0.21	

**Table 3.** Assessment of the level of ensuring the economic security of an oil company (production and technological element - PT)

Index	Forecasted value of the indicator			Actual values 2019	d	Integral indicator PT
	LES <sub>1</sub>	LES <sub>2</sub>	LES <sub>3</sub>			
Growth rate of oil and gas condensate production,%	> 5	3-5	<3	-6.66	1.21	0.65
Growth rate of R&D expenditures,%	> 10	5-10	<5	-100	7.00	
Growth rate of the rate of return on assets,%	> 10	5-10	<5	0.81	0.28	
Fund return on non-current assets,%	> 20	15-20	<15	-2.35	0.50	
Capital-labor ratio growth rate	> 10	5-10	<5	14.59	0.64	
Fixed assets depreciation rate,%	<50	50-70	> 70	23.42	0.39	
Growth rate of environmental protection costs,%	> 10	5-10	<5	1.87	0.21	
Growth rate of expenses for payment of excess payments for environmental pollution,%	<0	0-5	> 5	0.01	1.00	
The growth rate of expenses for providing information safety,%	> 10	5-10	<5	0.01	0.33	

**Table 4.** Assessment of the level of ensuring the economic security of an oil company (personnel element - P).

Index	Forecasted value of the indicator			Actual values 2019	d	Integral indicator P
	LES <sub>1</sub>	LES <sub>2</sub>	LES <sub>3</sub>			
Growth rate of employee turnover,%	<0	0-5	> 5	-0.22	0.08	0.22
Growth rate of the ratio of the number of employees with higher education / total number of employees,%	> 10	5-10	<5	3	0.35	
Growth rate of wages,%	> 10	5-10	<5	0.54	0.13	
Growth rate of labor protection costs,%	> 10	5-10	<5	11.84	0.30	
Labor productivity growth rate,%	> 10	5-10	<5	5.4	0.46	

After the formation of a set of indicators, determination of the level of their variation in accordance with the existing and approved standards [10], and their distribution into three blocks - financial, production and technical, personnel - the conditional values of dij were calculated using the method of shifted ideal. Based on the three formed integral indicators F, PT and K, a complex indicator (level of economic security) of the LES was calculated, according to the geometric mean principle. The indicator takes values from 0 to 1. The levels of economic security were also identified: LES<sub>1</sub> - sufficient; LES<sub>2</sub> - acceptable; LES<sub>3</sub> - unacceptable (table 1).

Thus, the following sets and levels of indicators were formed for the company's reporting data (tables 2-4).

According to the oil and gas company (branch), the indicators were calculated, and the overall level of economic security was 0,42 points, which corresponds to an unacceptable level of protection against threats in all elements of the system. Urgent measures are required to improve the level of economic security. The result obtained is fully consistent with expert opinions on the level of economic security of this enterprise, and a decision was made to include it in a larger structure.

#### 4. CONCLUSIONS

Thus, in the course of the study, the author's definition of the concept of economic security of an enterprise was formulated, a methodology for assessing the level of economic security of an enterprise was developed and the methodology was tested, which proved its effectiveness.

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