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# Winter 2018 Volume IX, Issue 8(38)

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## Accounting-Analytical and Evaluating Procedures for Defining the Economically Feasible Activities of the Oil Processing Enterprises of Kazakhstan

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#### Abstract:

The issue of economic safety of an enterprise implying the security, control, insurance or modernization of the production is currently rather popular. So, the main objective of the paper is narrowed to the characteristics of the accounting-analytical and evaluating procedures for defining the economically feasible activities of the enterprises. The paper presents an analysis of the work of the oil processing enterprises in the territory of Kazakhstan. The novelty of the research is in the fact that due to the devaluation of the national currencies and the decrease in the cost of the oil barrel, a significant extent of the conducted

and implemented operations has lost its economic sense. The paper notes that the feasibility of conducting particular financialeconomic procedures should be estimated not by the strategical parameter, but also by the set of rules and tricks of the analytical and evaluating procedures. We defined the basic approaches to the evaluation of the attributes for conducting the economically feasible activities.

Keywords: economic safety; risk; economic activity; infrastructure; loss.

#### JEL Classification: L32; L53.

#### Introduction

The purpose of the systems of the attributes for conducting economically feasible activities is in the organization of safe and reliable measures on the access to the indicators of economic activities, ways of transfer and storage of the indicators of economic activities, the methods for processing of the indicators of economic activities, the rules of managing the access to the indicators of economic activities, the ways of recovery of the indicators of economic activities, the rules of the attribute system of the reservation of the indicators of economic activities (Bennett *et al.* 2014). The tasks of the attribute system of the economically feasible activities are caused by its purpose and are conducted in the following: safe and reliable storage and transfer of the indicators of economic activities; limitation and control of access to the indicators of economic activities, dealt by the employees; creation of the rules for safe work with the information; conduction of the measures on the reservation of the indicators of economic activities; numericators of economic activities in the electronic of the attributes of conomic activities at the proper level (Davies *et al.* 1992).

The provision of the attributes of conducting the economically feasible activities at the age of the postindustrial economy is becoming vital for the successful existence of the enterprise (Terry and Lernia, 2013). On the other hand, it causes the issue of a proper definition of the attribute of economically feasible activities of the enterprise, the indicators characterizing it, which would ensure a proper level of the attributes of conducting economically feasible activities of the enterprise (Väyrynen and Kinnula 2012). So, an important issue is the issue of evaluation of these indicators in the conditions of uncertainty peculiar to the sphere of security (Miranda Sarmento 2018). Currently, to ensure the proper condition for conducting economically feasible activities one needs not just the development of particular security mechanisms, but the implementation of the systemic approach including the complex of interconnected measures (the use of special technical and program means, organizational measures and events, regulatory documents etc.) (Coxall 1992). The main goal of any system for ensuring the attributes of conducting economically feasible activities is the creation of the conditions for operation of the enterprise, the prevention of the threats for its security, defense of the legal interests of the enterprise from the unlawful activities, prevention of frauds, disclosure, leak, and distortion of the service indicators of economic activities, provision as part of the industrial activities of all the enterprise subdivisions (Aspara 2009).

In the papers of some of the above-listed authors, one may see a great number of indicators characterizing the state of the attributes of conducting economically feasible activities (Steger *et al.* 2009), the other – the measures of the increase in the level of security of the indicators of the enterprise's economic activities (Alonso *et al.* 1988), the third – complex methods that first are unfortunately difficult to introduce due to a great number of diverse indicators, while on the other hand – it is challenging to comply them with the existing legislation and with the international and national standards regulating the activities connected with the economic security (Walsh 1995). Thus, there is a need in the development of the complex indicators for evaluating the state of the attributes of conducting economically feasible activities of the enterprise, the methods for its calculation and definition of the extremal values of particular indicators ensuring sufficient level of attributes of conducting economically feasible activities.

#### 1. Materials and Methods

The evaluation of the indicators of economic activities, provided to the persons making decisions, the economic service of the enterprise it is suggested conducting with the use of three indicators: the coefficient of completeness, the precision coefficient and the contradiction coefficient of the indicators of economic activities, which should be supplied with the coefficient of timing coefficient of providing the indicators of economic activities and the reliability coefficient of the indicators of economic activities (Barua and Chellappa 2002). Notably, to obtain the indicators of economic activities, necessary for calculating of the presented indicators, it is obligatory to have the monitoring system of the enterprise's economic service activities (Trifu 2012).

The quantitative analysis modeling is those instrumental means that provide an opportunity to assess, highlight, though approximately the existing risk from the non-existing (imaginary). However, in the majority of the

cases, only qualitative analysis is not enough to identify and highlight the existing factors of risk and the ignorance of the non-existing (imaginary) (Dahle, 2000). For this purpose, one should conduct a quantitative analysis of the danger. And this requires obtaining the existing indicators of economic activities (Thomas, 1992).

The paper uses the theory of uncertain multitudes implying an opportunity of expanding the use of the parameters of the attributes of conducting economically feasible activities, which allows understanding the effectiveness of protection of the enterprise in the conditions of the economic environment of unstable type and risk-oriented economic situation. In this regard, the uncertain multitude is narrowed to the solution of the task evaluating the risks of the enterprise. To assess the economic activities, the staff, it is suggested to calculate the coefficient of legal protection of indicators of economic activities, the coefficient of the staff's work experience ensuring the economic safety of the enterprise, the coefficient of reliability of the staff, the economic safety of the enterprise and the coefficient of the staff's readiness to the detection of threats (Suematsu 2014).

#### 2. Results and Discussion

To ensure the protection of the economic environment of the enterprise it is necessary to systemically implement the following stages (Figure 1) (Edinger-Schons *et al.* 2018):

- Analysis of threats to the attributes of conducting economically feasible activities;
- Planning and development of the measures on ensuring the attributes of conducting economically feasible activities;
- Operative implementation of the planned actions.

Figure 1. The Operation Scheme for the Attributes of conducting Economically Feasible Activities of the Enterprise



The diagnostics of the level of attributes of conducting the enterprise's economically feasible activities is proposed to be carried out in three key areas (Figure 2): evaluation of software and hardware security indicators of economic activities; assessment of economic reliability of personnel; evaluation indicators of economic activities provided to decision makers, the economic service of the enterprise (Roos 1975).

Figure 2. Definition of the State of the Attributes of conducting Economically Feasible Activities of the Enterprise



The ways assessing the risks of attributes of conducting economically feasible activities are presented in Figure 3.



Figure 3. Approaches to Assessing the Risks of the Attributes of conducting Economically Feasible Activities

The risk analysis takes into account all possible multiple ways of spreading threats from a single source. The threat level (Pi) values required for the calculations are determined based on the probability of the threat activation and the vulnerability levels of the infrastructure components on the threat propagation paths:

$$P_i = P_a \times T W_{z,z+1} \tag{1}$$

Where:  $P_a$  – the probability of activation of the threat;

 $Tw_{z,z+1}$  – the level of vulnerability of the infrastructure component.

Quantitative model of risks operates with such concepts as Annualized Rate Occurrence (ARO); Single Loss Expectancy (SLE); Annualized Loss Expectancy (ALE), is calculated as follows

$$ALE = ARO \times SLE \tag{2}$$

The Single Loss Expectancy is calculated by multiplying the cost of indicators of economic activities (Asset Value – AV) by the Exposure Factor (EF):

$$SLE = AV \times EF \tag{3}$$

The Exposure Factor is the amount of damage or impact on the value of the asset (from 0 to 1), *i.e.* the part of the value that the asset will lose as a result of the event.

After the initial assessment of risks, the values obtained should be systematized according to the degree of importance for the detection of low, medium and high levels of risks. The risk management method involves several modes of action. Risk can be as follows:

- Accepted (assumption), *i.e.* one agrees to the risk and to the related losses. In this case, the operation continues as normal;
- Reduced (mitigation) in order to reduce the value of the risk that is planned with the adoption of particular measures;
- Transferred (transference) in order to compensate for the potential damage that is imposed on the insurer's company or the risk is transformed into another risk with a lower value through the introduction of special mechanisms;
- The method of assessing attributes of conducting economically feasible activities on the basis of
  economic indicators operates with business-friendly arguments about the need to ensure and improve
  attributes of conducting economically feasible activities (Paterson 1993).

Based on the components of the economic and communication environment, the assessment system should include as follows:

 Integrated indicator regarding the level of management of economic and communication environment development, including assessment of document management (w1), management of economic systems development (w2), management of communication processes (w3), and management of economic development of personnel (w4); Integral indicator regarding the level of management of activities in order to prevent and counteract the threats to the attributes of conducting economically feasible activities, which includes the assessment of indicators such as planning and organization of activities on the grounds of conducting economically feasible activities (w5), document protection control (w6), the implementation of organizational measures of access to economic assets (w7), organizational means of control over the work of IP users and maintenance personnel (w8), training of employees in the basics of attributes of conducting economically feasible activities (w9), compliance with the regulations attributes of conducting economically feasible activities (w10), organization of access control and protection (w11).

Generally, the assessment of the level of attributes of conducting economically feasible activities (lib) will be defined in accordance with the following formula

$$Iib = a \times Ia + b + Ib \tag{4}$$

Where: *Ia*, *Ib* – integral indicators of the level of informatization management and ensuring attributes of conducting economically feasible activities, respectively;

a, b – priority vectors of integrated indicators of the level of information management and economic security management.

The evaluation of the integral indicator regarding the level of informatization management should be carried out according to the following formula:

$$Ta = \sum_{i=1}^{n} \lambda_i \times w_i \tag{5}$$

Where:  $W_i$  – indicators characterizing the state of informatization management;

 $\lambda_i$  – significance coefficients indicating the state of informatization management.

Integral indicator regarding the level of management of activities in order to prevent and counteract the implementation of threats to the attributes of conducting economically feasible activities will count as (Gürakar 2016)

$$Ib = \sum_{i=1}^{n} \lambda_{j} \times w_{j} \tag{6}$$

Where:  $W_{i-}$  indicators characterizing the state of management of activities to prevent and counteract the implementation of threats to the attributes of conducting economically feasible activities;

 $\mathcal{A}_i$  – coefficients of the significance of indicators of the state of management of activities to prevent and counteract the implementation of threats to the attributes of conducting economically feasible activities.

To estimate, we use the Harrington scale, consisting of five intervals:

(1) very high intensity of criterion property (x = 1,0-0.8);

- (2) high (x = 0.79 0.64);
- (3) average (x = 0.63 0.38);
- (4) low (x = 0.37 0.2);
- (5) very low (x = 0.19 0.00).

The average numerical rating on the scale of Harrington: xmid = {0.9; 0.71; 0.5; 0.28; 0.1}.

To form the estimated characteristics of economic and technical indicators, it is advisable to use the approach of modeling the maturity of abilities as characteristics of functioning quality. This is because the model of maturity is the tenet of the transition of the accumulated quantity of competencies (knowledge, skills, abilities) to the new quality. Thus, we can distinguish the following levels of maturity of the economic infrastructure of business processes. Basic level. The infrastructure of the first basic level of maturity is a low degree of automation of processes, minimal centralization of management, careless attitude to standards and security policies, management of existing backup systems. The organization lacks a clear understanding of the details of its system and knowledge of how to upgrade it with the greatest effect. When moving to the next standardized level, you can obtain significant gains through the development and implementation of standards and policies by automating manual and time-consuming operations, implementing the best practices (IT Infrastructure library, etc.). This will reduce the security-related risks and will also contribute to the radical reduction in the cost of maintaining its infrastructure (Detter and Fölster 2015).

Standardized Level. This is the level at which the standards and policies of the administration of servers and computers are applied to properly connect the machine to the network, the resources management occurs on the

basis of programs Active Directory, and uses the optimized security policies and access control. Business processes with the maturity level of the Standardized infrastructure have a fairly clear base of hardware and software, and start managing the licenses. In order to restore or deploy new applications and services, they have to make moderate costs and efforts (and sometimes, they are high, the same as before). The external protection is enhanced by blocking the perimeter of the network, and the internal one leaves much to be desired. In the transition to a higher, rationalization level, it is possible to control the infrastructure more, which will respond to the problems before they occur.

Rationalized Level. This level of maturity is characterized by minimal costs for managing servers and computers, increasing the authority of processes and policies to support and expand the business. The protection is reduced to the use of preventive measures, the response to any security threat is predictable and fast. Dynamic level allows one to fully understand the value of the infrastructure strategy, which helps to effectively conduct business and constantly stay ahead of competitors. The processes are fully automated and are often incorporated directly into its systems, allowing one to manage these systems according to one's business needs. Additional investments in technology provide a quick and pre-calculated return on business. The use of software with automatic updates (self-provisioning software) and systems with quarantine support (quarantine-like systems) allows one to ensure the correct management of updates and compliance with the established security policies while increasing their reliability. This also helps to reduce costs and to increase the service levels (Scott 2003).

The calculation is carried out on the example of enterprises of the oil refining industry, namely LLP Atyrau Oil Processing Factory, LLP Pavlodar Oil Chemistry Factory. Let us analyze the financial condition of the enterprises. As for the LLP Pavlodar Oil Chemistry Factory, we see in 2016, reducing the assets by 12437 thousand tenges or by 9.62 %, but in 2017 the assets grow by 34922 thousand tenges or 29.89 %. Negative changes have occurred in the current assets of the enterprise. Latter decreased by 15938 thousand tenges in 2016, and in 2017 they grew by 29044 thousand tenges. Non-current assets of the enterprise increased by 3501 thousand tenges in 2016, and in 2017 – by 5878 thousand tenges, due to the introduction of new fixed assets, including the initial cost of fixed assets in 2016 increased by 10585 thousand tenges (43.66 %), and in 2017 – by 19304 thousand tenges (55.42 %).

With regard to LLP Atyrau Oil Processing Factory, one may observe the increase in assets by 6385 thousand tenges or 1.42 % in 2016, and in 2017, the assets of the enterprise grew by 308309 thousand tenges or by 67.58 %. This situation takes place due to changes, primarily in the current assets of the enterprise, in 2016 increased by 116 thousand tenges, and in 2017 increased by 294909 thousand tenges. Non-current assets of the enterprise increase in 2016 by 6269 thousand tenges, and in 2017 – by 13400 thousand tenges, due to the introduction of new fixed assets. Assets of LLP PetroKazakhstan Products grew in 2016 by 79217 thousand tenges, and in 2017 – by 107217 thousand tenges. The growth of assets in 2016 is due to both non-current assets by 68.4 % and current assets by 31.3 %. As for non-current assets, their increase was due to the long-term financial investments. In 2017, non-current assets decreased by 35.6%.

A negative phenomenon peculiar to the enterprises analyzed is the high proportion of accounts receivable. All of the enterprises have accounts receivable for the work performed. Its highest percentage value is observed in LLP Pavlodar Petrochemical Factory – 25.85 %. Also, the share of the other current receivables is high, for LLP PetroKazakhstan Products it is 36.2 %. This means that the enterprise actually lends to its business partners, who did not pay for the goods and services provided by the enterprise on time. In General, we can state the deterioration of the structure of current assets of the enterprises due to the decrease in inventories and growth in work in progress. In General, we can note a negative trend towards a decrease in the turnover of current assets. So, the turnover ratio of current assets at LLP Atyrau Oil Processing Factory decreased by 25.89 %, at LLP PetroKazakhstan Products – by 28.15 %, and only at LLP Pavlodar Oil Chemistry Factory, it increased by 32.56 % thus deteriorating the efficiency of use of circulating assets of the enterprises. Fixed assets of enterprises are suitable for use (the level of wear is in the range from 12 % to 54 %).

When analyzing the liabilities of enterprises, one should note the tendency to reduce the equity. Thus, losses are received by such of the enterprise as LLP PetroKazakhstan Products. A negative phenomenon is the high value of long-term liabilities, especially long-term Bank loans. Their share in the structure of assets as of 1/1/2018 ranges from 0.13 % in LLP Atyrau Oil Processing Factory, and to 37.9 % in LLP PetroKazakhstan Products. All the enterprises, with the exception of LLP Atyrau Oil Processing Factory, are characterized by an increase in the share of long-term Bank loans. The enterprises have significant amounts of current liabilities, especially for goods, works, and services. This indicates the inability of enterprises to pay suppliers and contractors in a timely manner for the work performed and services received.

The financial results of the enterprises are presented in Table 1. Only two enterprises LLP Pavlodar Oil Chemistry Factory and LLP Atyrau Oil Processing Factory made profits. However, the profitability of production of these enterprises is low in LLP Pavlodar Oil Chemistry Factory -0.155 %, and in LLP Atyrau Oil Processing Factory -1.75 %. They are experiencing an increase in the revenue from the sales and expenditure growth, with the expenditure growth rates 3.9% higher than the growth rate of income.

ltem	LLP Chemi	Pavlodar Oil istry Factory	LLP Atyrau	Oil Processing Factory	PetroKazakh	LLP stanProducts
	2016	2017	2016	2017	2016	2017
Net income from sales	253,251	347,822	315,764	319,753	158,048	98,785
Cost of sales	241,595	341,234	254,631	257,384	134,080	86,622
Gross profit	11,656	6,588	61,133	62,369	0	0
Profit (loss) beforetax	2,957	529	2,762	4,512	1,570	-10,315
Net profit (loss)	1,179	317	1,949	3,356	861	-10,315

Table 1. Dynamics of Financial Results of the Enterprises, Thousand Tenges

The income of LLP PetroKazakhstan Products decreased by 37.5 %, while the decrease in expenses occurred at a slower rate of 48.8 %, 60.9 %, and 35.4 %, respectively. This indicates deterioration in the performance of the enterprises. We will analyze the financial condition of the enterprises. Only in LLP PetroKazakhstan Products, the level of absolute liquidity corresponds to the normative value, the rest of the enterprises do not have sufficient funds to cover current liabilities. However, according to the indicators of quick and current liquidity, LLP Atyrau Refinery and PetroKazakhstan Products are able to meet the obligations. The dynamics of financial stability indicators are shown in Table 2. The coefficient of autonomy shows that the financial condition of such enterprises as LLP Atyrau Oil Processing Factory, LLP PetroKazakhstan Products is threatening due to the use of mainly attracted funds for financing the production and the economic activities, the situation in LLP Pavlodar Oil Chemistry Factory is slightly better (the coefficient of autonomy as of 1/1/2018 is 0.17).

Indicator	LLP Chen	Pavlodar nistry Faci	Oil tory	LLP A	Atyrau Oil Proce Factory	ssing	LLP PetroKazakhstan Products				
	2016	2017	2018	2016	2017	2018	2016	2017	2018		
autonomy coefficient	0.19	0.22	0.17	0.02	0.03	0.02	0.03	0.02	-0.01		
financing coefficient	4.34	3.50	4.77	41.93	35.92	47.66	29.32	37.52	0		
coefficient of security with own working capital	0.07	0.16	0.03	0.32	0.22	0.62	0.58	0.50	0.70		
the flexibility coefficient of own capital	0.30	0.57	0.16	12.49	7.26	27.51	19.30	18.52	-85.36		

 Table 2. Analysis of the Financial State Indicators

High rates of financing of the enterprises testify to the critical financial condition because of the funding involved significant investment. To ensure its own working capital, the LLP Pavlodar Oil Chemistry Factory as of 1/1/2018 - 0.03, which indicates the absence of its own working capital. This is confirmed by the coefficient of maneuverability of the equity. The analysis of the business enterprises is done by the calculation of the indicators (factors) as the turnover ratio of assets, turnover ratio of receivables, turnover ratio of payables.

Thus, we can make a general conclusion that the selected enterprises are the leaders of the region in the field of construction, but today they operate in extremely difficult conditions, which negatively affects the effectiveness of their activities and further development. On the grounds of conducting economically feasible activities, its evaluation at of the enterprise is not carried out due to the lack of an economic base. In this regard, we suggested the evaluation of the external risks. At the first stage of assessment of the level of economic security, the management should determine vectors of priorities of the component (a, b) on the basis of ranking (Table 3).

Table 3. Vectors of the Components' Priority of the Attributes of conducting Economically Feasible Activities

Indicator	External Assessment of Risks										Specific										
Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	weight
а	1	2	1	2	1	1	1	1	1	1	1	1	2	2	1	2	1	1	1	1	0.42
b	2		2		2	2	2	2	2	2	2	2			2		2	2	2	2	0.58

Next, we assess the priorities of the indicators, provided that the number of factors n = 11, and the number of external threats m = 20. The assessment of the degree of parameters' significance is carried out by assigning to them a rank number. The factor that gets the smallest one is assigned rank 1. If several factors are recognized as equivalent, they are assigned the same rank number. Based on the questionnaire data, a summary matrix of ranks is compiled, which is presented in Table 4.

Risk/ Indicator	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
<i>w</i> 1	1	1	2	1	1	2	1	1	2	1	3	2	1	1	1	2	2	1	2	1
w 2	4	4	3	4	4	4	4	4	4	4	2	4	4	4	4	4	4	4	4	4
w 3	2	3	4	3	2	3	2	2	3	2	2	3	2	3	2	3	1	3	1	2
w 4	3	2		2	3	3	3	3	3	3		3	3	2	3	3	3	2	2	3
w 5	7	6	5	6	7	6	5	7	7	5	7	7	5	7	7	5	7	7	5	7
<i>w</i> 6		2		2																
w 7	4	3	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
<i>w</i> 8	3	4	3	4	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
w 9	6	7	6	7	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
<i>w</i> 10	5	5	7	5	5	5	7	5	5	7	5	5	7	5	5	7	5	5	7	5
w 11	2	1	2	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2

Table 4. Ranging of the Indicators of the Attributes of Conducting Economically Feasible Activities

We apply the calculation of the risk share agreement according to the concordance coefficient:

$$W = \frac{S}{\frac{1}{12}m^{2}(n^{3}-n) - m\Sigma T_{i}}$$
(7)

where m – number of risks; n – number of indicators;  $T_i$  – the number of links (kinds of repeated elements) in the assessments of i-risk

$$T_{i} = \frac{1}{12} \sum \left( t_{i}^{3} - t_{i} \right)$$
(8)

where – the number of elements in the d-th bundle for the i-th risk (the number of elements that are repeated). When assessing the consistency of risk relative ranks of the indices, we obtained concordance coefficient W = 0.91, which indicates the presence of a high degree of risk consistency. As a result, we have the following coefficients of the indicators significance

 $\lambda_{i,j} = \{0, 14; 0, 38; 0, 24; 0, 24; 0, 22; 0, 04; 0, 14; 0, 11; 0, 22; 0, 2; 0, 07\}$ 

We will assess the level of management for LLP Atyrau Oil Processing Factory. The calculated concordance coefficient is 0.72, which indicates a high degree of consistency of the risks. We calculate the values of indicators taking into account the coefficients of significance in Table 5.

 Table 5. Assessment of the Level of Information Security Indicators at LLP Atyrau Oil Processing Factory

Indicator	w <sub>i,j</sub>	$\lambda_{i,j}$	$\lambda_{i,j}  imes w_{i,j}$
w 1	0.82	0.14	0.11
w 2	0.368	0.38	0.14
w 3	0.66	0.24	0.15
w 4	0.306	0.24	0.07
w 5	0.4325	0.22	0.10
w 6	0.4325	0.04	0.02
w 7	0.4735	0.14	0.07
w 8	0.6365	0.11	0.07
<i>w</i> 9	0.255	0.22	0.06
<i>w</i> 10	0.626	0.2	0.13
<i>w</i> 11	0.862	0.07	0.06

la=0.11+0.14+0.15+0.07=0.47;

lb=0.1+0.02+0.07+0.07+0.06+0.13+0.06=0.49;

lib=0.42\*0.47+0.58\*0.49=0.2+0.28=0.48.

We will assess the level of management for LLP Pavlodar Oil Chemistry Factory. The calculated concordance coefficient is 0.71, which indicates a high degree of consistency of the risks. We calculate the values of indicators taking into account the coefficients of significance in Table 6.

Table 6.Assessment of the Level of Information	Security Indicators for L	LP Pavlodar Oil	<b>Chemistry Factory</b>

Indicator	W <sub>i,j</sub>	$\lambda_{i,j}$	$\lambda_{i,j}  imes w_{i,j}$
w 1	0.809	0.14	0.11
w 2	0.324	0.38	0.12
w 3	0.605	0.24	0.14
w 4	0.295	0.24	0.07
w 5	0.401	0.22	0.09
w 6	0.486	0.04	0.02
w 7	0.402	0.14	0.06
w 8	0.626	0.11	0.07
w 9	0.228	0.22	0.05
w 10	0.626	0.2	0.13
w 11	0.7175	0.07	0.05

la=0.11+0.12+0.07+0.14=0.44; lb=0.09+0.02+0.06+0.07+0.05+0.13+0.05=0.46; lib=0.42\*0.44+0.58\*0.46=0.18+0.27=0.45.

We will assess the level of management for LLP PetroKazakhstan Products. The concordance coefficient of 0.77 indicates a high degree of consistency of the risk. We calculate the values of indicators taking into account the coefficients of significance in the Table 7.

Indicator	W <sub>i,j</sub>	$\lambda_{i,j}$	$\lambda_{i,j}  imes w_{i,j}$
w 1	0.7575	0.14	0.11
w 2	0.335	0.38	0.12
w 3	0.48	0.24	0.11
w 4	0.219	0.24	0.05
w 5	0.39	0.22	0.08
<i>w</i> 6	0.412	0.04	0.02
w 7	0.285	0.14	0.04
w 8	0.605	0.11	0.07
w 9	0.21	0.22	0.05
w 10	0.5945	0.2	0.12
w 11	0.638	0.07	0.04

Table 7. Assessment of the Level of Information Security Indicators for LLP PetroKazakhstan Products

la=0.11+0.12+0.11+0.05=0.39:

Ib=0.08+0.02+0.04+0.07+0.05+0.12+0.04=0.42; Iib=0.42\*0.39+0.58\*0.42=0.16+0.24=0.40.

We propose to interpret the results in the following scale of evaluation:

0<Kb<0.19 – critical level, marked by a high probability of receiving critical losses of assets or a complete loss of reputation of the enterprise in the market, making it impossible for its further activities;

0.2< IIB <0.37 – low, there is a high probability of large losses of assets and causing significant damage to the reputation of the enterprise;

0.38< IIB <0.63 – average level, characterized by an average probability of obtaining significant losses of assets or significant loss of reputation of the enterprise;

0,64<lib <0.79, which is a high level, there is the probability of obtaining a moderate loss of assets or insignificant influence on the reputation of the enterprise;

0.8< IIB <1 – very high level, low probability of asset loss or impact on the reputation of the enterprise; In general, we received the following estimates, which are given in Figure 4.



Figure 4. The Results of Assessment of the Enterprises' Management Level 2017

As can be seen from Figure 4, the average level of attributes of conducting economically feasible activities is typical for such enterprises as LLP Atyrau Oil Processing Factory, LLP Pavlodar Oil Chemistry Factory, LLP PetroKazakhstan Products, and has a low level of attributes of conducting economically feasible activities. High

ratings of risks in almost all of the enterprises received the document management (w1) and the organization of access control and protection (w11). Let us suppose that the value of economic losses from damage to object  $O_i$  in channel  $V_{ij}$  is equal to that of  $w_{ij}$ , and the cost of a loss from damage to the means of protection is minor. In this case, the calculation of economic losses from the attacks is as follows:

$$W = \sum_{i=1}^{N} \sum_{j=1}^{N_i} w_{ij} Bin(r_{ij}, n_{ij})$$

$$M$$
(9)

where  $r_{ij} = \prod_{m=1}^{S} s_{mij}$  – the probability of hacking in channel V<sup>ij</sup>, Min(r<sub>ij</sub>, r<sub>ij</sub>) is a random variable with the binomial distribution. The wave above the symbol emphasizes that the value is random. We should note that a more general case, taking into account the possible damage to both objects of protection and means of protection, was discussed earlier. We consider the investment project of implementation (modernization) of the system to ensure the performance of economically feasible activities for a period of T years. Capital costs for the purchase of equipment and its installation will be attributed to the initial time t=0 and denote C<sub>0</sub>. Maintenance costs in year t are denoted by C<sub>t</sub> and the attribute at the end of the year. Then the total flow of investment costs will be determined by the vector C= (C<sub>0</sub>, C<sub>1</sub>, ..., C<sub>T</sub>).Random losses caused by the attacks will also be attributed to the end of this year. The flow of these losses under the installed system of conducting economically feasible activities is denoted by W= (0, W<sub>1</sub>, ..., W<sub>T</sub>), and without the system of conducting economically feasible activities is denoted by the vector E= (E0, E<sub>1</sub>, ..., E<sub>T</sub>):

$$E = C + W \tag{10}$$

Then the flow of conditionally saved funds from the implementation of the management system economically feasible activities  $S = (S_0, S_1, ..., S_T)$  will be equal as follows:

$$S = L - E \tag{11}$$

Let r be the required interest rate that we accept constant in time. To estimate the cash flow, use the net present value indicator (NPV), which will be a random variable:

$$NPV(E) = \sum_{t=0}^{T} \frac{E_{t}}{(1+r)^{t}}$$
(12)

Assuming that the annual random losses are independent, we obtain the following formulas for the expectation and variance of this value:

$$M(NPV(E)) = \sum_{t=0}^{T} \frac{M(E_t)}{(1+t)^t}$$

$$D(NPV(E)) = \sum_{t=0}^{T} \frac{D(E_t)}{(1+t)^t}$$
(13)

$$D(NPV(E)) = \sum_{t=0}^{\infty} \frac{-(-t)^{2t}}{(1+t)^{2t}}$$
(14)

For the interval estimation of the kc-cost of NPV of the total costs, which will not be exceeded with the probability Pkc, we find:

These values allow us to estimate the average value of NV total costs for protection systems and the possible deviation from them. For a random variable NPV costs NPV (E) the following inequality is satisfied, which received such a rating:

$$\forall k > 0P(NPV(E) < M(NPV(E)) + k\sigma(NPV(E))) \ge 1 - 1/k^{2}$$
(15)  
Value  

$$E_{k\sigma} = VaR_{k\sigma} = M(NPV(E)) + k\sigma(NPV(E))$$
(16)

which determines the maximum value of NPV costs with reliability, we will call -the cost of risk a. This value satisfies three axioms of coherent measures of risk a: positive homogeneity, shift invariance, and subadditivity.

Table 10 contains the results of the calculation of six indicators for these protection companies:

- (1) NPV losses in the absence of economically feasible activities NPV(L);
- (2) NPV of the total investment costs of maintaining economically feasible activities NPV(C);
- (3) The mathematical expectation of the random NPV of losses from attacks M(NPV(W));

- Standard deviation (sec. K. V.) NPV of random losses from attacks σ (NPV(W));
- (5) Indicator of the effectiveness of 'three Sigma' for the NPV of the total cost  $E_{3\sigma}$ = VaR<sub>3</sub>, (NPV);
- (6) Indicator of conditionally saved funds  $S_{3\sigma}$ =NPV(L)– $E_{3\sigma}$ .

Enterprise	NPV(L)	NPV(C)	M(NPV(W))	$\sigma(NPV(W))$	E <sub>3σ</sub>	$S_{3\sigma}$
LLP Pavlodar Oil Chemistry Factory	30,478	44	184	79	466	30,012
LLP Atyrau Oil Processing Factory	30,478	347	163	60	692	29,786
LLP PetroKazakhstan Products	30,478	55	548	233	1,301	29,177

Table 8. Economic Indicators of Security Profiles (thousand tenges)

The analysis of the results shows that the management profile of economically feasible activities is more expensive than the management profile of economically feasible activities at the LLP Pavlodar Oil Chemistry Factory, but has a lower mathematical expectation and standard deviation of the random value of losses, and, as a result, is the best in the generalized indicator of risks. The management profile of economically feasible activities at the LLP Atyrau Oil Processing Factory compared to the management profile of economically feasible activities at the LLP Pavlodar Oil Chemistry Factory provides fewer losses from attacks. However, due to significant investment costs, this profile has a large resulting indicator of risk. Comparison of the profiles of economically feasible activities at the LLP PetroKazakhstan Products shows that it is better to use the profile of LLP PetroKazakhstan Products, although it is more expensive. It is also easy to see that even the most expensive profile of economically feasible activities provides a significant amount of conditionally saved funds. Note that the computational complexity of finding interval estimates is only about twice as large as for the case of clear input data, which allows calculations by means of spreadsheets.

#### Conclusions

The conducted research showed that the considered methods for assessment of the economic effectiveness of conducting economically feasible activities may be successfully applied for the rational choice of protection profile in case of uncertain input data. It may also be used for the calculation of the insurance tariffs in the insurance of the economic risks. Thus, the study of the basic approaches to the assessment of the attributes of conducting economically feasible activities allowed forming the directions for improvement of such an assessment in the economic security management system of the enterprises of construction branch concluded in the necessity of studying the indicators of attributes of conducting economically feasible activities of the suggested approach are in the detailization and concretization of the assessment, which will allow defined the measures on the provision of attributes of conducting economically feasible activities enterprises of construction branch on a more substantiated basis.

The standards in the sphere of attributes of conducting economically feasible activities are the basis for the formation of the economic security management system at the enterprises of the construction branch. We defined the drawbacks of the existing standards and revealed their key provisions in the formation of the economic security management system. Based on the provisions of the standards, they also revealed the consequence of implementing the economic security management: and defined the spheres of action – the object of attributes of conducting economically feasible activities, the development of the risk management policy, including the control based on their assessment.

The system of economic security management of construction enterprises is an aggregate of sub-systems the enterprise's economic-communication elements management (personnel management, document flow, communications, and economic systems) and organization-management, organization-legal, economic, engineering-technical and integration subsystems for ensuring the attributes of conducting economically feasible activities. The organization-economic management instruments ensure the systemic and efficient solution of the problems connected with the attributes of conducting economically feasible activities enterprises of the construction branch in the unstable economic conditions considering the development of the informatization processes in the modern society. The assessment of the attributes of conducting economically feasible activities is in the creation of the opinion regarding the maturity of the processes ensuring the attributes of conducting economically feasible activities, the adequacy of the protection measures used or the reasonability (sufficiency) of the investments (costs)

for ensuring the necessary level of attributes of conducting economically feasible activities based on the measurement and assessment of the critical elements (factors) of the object assessment.

We analyzed the approaches towards assessing the attributes of conducting economically feasible activities at the enterprises and defined the ways of assessment: by the references, risk-oriented and based on studying the economic indicators. They formed the direction for improvement of assessing the attributes of conducting economically feasible activities of the enterprises from the construction branch, concluding in studying the indicators of the attributes of conducting economically feasible activities by the informatization management components and management of the measures on protection and counteract the threats to the attributes of conducting economically feasible activities. The main advantages of the suggested approach are in the detailization and concretization of the assessment, which will allow defining the measures ensuring the attributes of conducting economically feasible activities of the enterprises of the construction branch on a more substantiated basis. To assess the economic effectiveness of the investments to the conservative protection systems, we used the indicators of risk for pure amount of the costs considering the capital costs, servicing costs and accidental losses from the attacks. We also implemented the interval assessment of these indicators at uncertain input data set by the interval numbers.

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