Concept and Method for Determining Economic Security Level of Innovative Enterprises

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Abstract: The study focuses on the organization of the economic security system in innovative enterprises that are most affected by external and internal factors due to the presence of a high degree of uncertainty. The essence and principles of economic security, as well as the reasons that reduce the high level of security of the enterprise, are determined. Based on the results of studying the problem, the stages to increase the economic security level are highlighted in general terms. The need for continuous monitoring of the company's state has predetermined the development of an economic security system that contains responsibility centers, a set of indicators, information flow channels, security improvement directions, and measures to eliminate or prevent threats. The main part of the study is the author's method of assessing the economic security level, based on the use of an integral indicator, which is interpreted using a ten-point scale. The calculation of the integral indicator is based on expert analysis, which assumes the presence of a factor of subjectivism, which is a disadvantage, but it is eliminated with proper selection of specialists in the working group. The article presents a practical example of applying the developed methodology to a specific innovative enterprise using an individual system of indicators. Measures to eliminate problems related to the violation of the innovative enterprise security, are proposed.

Keywords: Economic security, innovative enterprise, integral indicator, system of economic security indicators.

I. INTRODUCTION

In modern conditions, the desire of economic entities to take a favorable position in the world market is of paramount importance. To achieve a decent competitive level, it is necessary to increase the innovative potential of the enterprise with the possibility of ensuring a high level of economic security. This need is caused by the growing role of science-intensive organizations as drivers of scientific and technological progress in the country as a whole. If there is a significant sensitivity of enterprises to changing environmental conditions, the issue of economic security comes first. The formation of an economic security system of individual economic entities is a component of the security of the economy as a whole. Sustainable development of enterprises is the basis for ensuring the economic security of the national economy. Since the overall well-being of the population depends on the successful activity of the country’s economic entities as a result of creating opportunities for implementing social programs, as well as replenishing budgets of various levels, it is advisable to secure their functioning as a support for their stable development.

II. ECONOMIC SECURITY CONCEPT

The essence of economic security is expressed, first of all, in the timeliness of identifying threats expressed in the leakage of strategically important information, unavailability of data about competitors, lack of awareness about changes in the external environment, presence of internal contradictions and misunderstandings among the management team, lack of a common goal and coherence. The introduction of an economic security system in the management structure of enterprises will increase the stability of positioning on commodity markets that corresponds to the target direction of the economic entity development [1, 19]. Innovative enterprises are an important link in building the country's development potential among global competitors. This type of business entities create and produce high-tech science-intensive products, characterized by a high level of competition in the global and domestic market. Thanks to successful developments, the necessary foundation is being formed to support the country's economy and develop it in accordance with state strategies and priorities. A distinctive feature of innovative enterprises is the presence of a significant share of uncertainty caused by the creation of completely new products [4, 5]. Due to this fact, there is a need to ensure high-quality information flows, the task of which is to timely and reliably provide the management and executors of enterprises with the necessary data. The lack of information serves as an indicator of the violation of an enterprise economic security. Thus, the basis of the security system of innovative enterprises is information flows and the signal of potential threats. The author's diagram of the economic security system of innovative economic entities is presented in figure 1 [11].

The centers of responsibility of an innovative enterprise at different levels of management must continuously respond to all incoming signals from both internal and external threats. Due to the unity of the enterprise as a multi-element system, it is necessary to create channels for transmitting information about the danger of disrupting the stable activity development. The channels must be provided with feedback to ensure confidence in the response. Detection of information channel breaks indicates a violation of the economic security system [7]. In addition, the economic security system of an innovative enterprise should include a list of indicators that serve as criteria for the level of emerging danger. The indicators are developed individually for each business entity based on the main goals of the enterprise and taking into account the specifics of its activity.

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In case of critical situations, the organization’s management must have instructions that include a set of measures and methods to prevent or eliminate threats. The main conclusion can be made that a condition for ensuring a high level of economic security is the formation of an information system that must contain reliable and continuously updated data necessary for rapid response to potential threats before negative consequences occur. The information system forms the basis for monitoring production processes, identifying negative trends and searching for promising areas of development.

The experience of analyzing trends in the economic entities development led to the formation of the basic principles of economic security [3]:

1. In modern conditions, economic security must be considered bilaterally, which implies both internal and external security. Ensuring external economic security is associated with the presence of a factor caused by economy globalization and emergence of competition for domestic producers in the world market. Internal economic security considers threats from competitors within the country.

2. Ensuring external economic security should include strengthening export promotion positions, as well as protecting domestic enterprises from imports. It is advisable to implement measures aimed at finding new export directions, improving competitiveness of goods abroad, and developing popular production profiles. Moreover, it is necessary to create import-substituting production and support mechanisms for domestic producers.

3. The level of external economic security reliability determines the degree of financial stability of the enterprise, which, in turn, forms the overall potential of the country.

4. The main work on creating an economically safe environment is to minimize and eliminate the risks of disrupting sustainability of the economic entity. Accounting and information support for management at all management levels should be based on the principle of timely provision of the data on changes in the external environment. In case of innovative enterprises, the database should be expanded as much as possible and continuously updated, since working in a high level of uncertainty requires taking into account all possible deviations from the plan. When implementing large innovative projects, a wide range of people, whose interests must be satisfied, are usually involved. However, the successful introduction of new products or technologies will help to shift the position of the economic entity to a more profitable position.

5. The economic security system of an enterprise should be built based on such control elements as forecasting, accounting, control, and analysis. Responsibility centers, distribution of responsibilities, composition of evaluation criteria, and frequency of work are determined by each company individually, depending on the frequency and nature of threats.

In the works by different scientists, we can note the variety of concepts of economic security: protection of information and preservation of trade secrets; possibility of achieving the enterprise goals; general welfare of the population and favorable economic environment;
maintaining production stability, etc. [2, 8, 14] However, economic security should be considered as a set of conditions necessary for the economic entity development, taking into account its strategic goals, providing an increase in financial benefits and benefits for the population, as well as forming a positive contribution to the potential of the country's economy. The composition of the necessary conditions for the growth of financial stability and competitiveness is individual for each economic entity. Such factors as availability of a sufficient level of funding, reliability of suppliers and partners, presence of state support, involvement of highly qualified specialists and personnel retention, and creation of permanent control over emerging deviations from the plan can be identified for an innovative enterprise [13]. Each company places the economic security formation elements in accordance with its priorities, but all the components must be considered in the system.

Violation of economic security leads to an increase in the probability of the enterprise bankruptcy. The impact of external threats can be unpredictable and unmanageable, but internal causes can be prevented by organizing competent management. Figure 2 shows the reasons that reduce economic security of an economic entity [20].

Thus, it is necessary to constantly monitor the state of an economic entity in conditions of uncertainty and risk using complex data of the accounting and information system. Since innovative enterprises operate in a poorly informed environment due to the lack of data on similar projects being implemented, special attention should be paid to modeling various scenarios and development strategies in the event of a particular situation [9, 18].

Fig. 2. Reasons that negatively affect the economic security level of an enterprise

Figure 3 shows the stages that allow creating conditions for high economic security of an innovative enterprise, which will minimize the risks of potential failures [15].

To assess the economic security level of an enterprise, it is necessary to develop a system of criteria that will serve as indicators of the stable state of the object under study. This criteria system should include both quantitative and qualitative characteristics of the current activity of an innovative enterprise that correspond to its strategic goals [10, 19]. These parameters of economic security should have thresholds that determine the level of acceptability of the existing risk of loss of financial stability and other threats.

Since innovative enterprises have their own specifics, the following groups of characteristics can be identified as the main indicators of the state of economic security [12]:
- financial-economic;
- organizational;
- social;
- personnel;
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- logistics;
- environmental;
- innovative;
- compliance with strategic goals;
- technological;
- investment;
- marketing.

Depending on the company's industry and management goals, these groups of characteristics may be supplemented or changed. Table 1 shows an example of decoding parameter group of the economic security level of an innovative enterprise.

| Group of characteristics | Components | | Group of characteristics | Components |
|--------------------------|------------|--------------------------|------------|
| Financial-economic      | - revenue volume; | - revenue from innovations implementation;  | - level of funding and capital investment in innovative projects. |
|                         | - net profit volume; | - availability of state orders; | - ratio of the plan and the actual results of the company's activities. |
|                         | - profitability index | - compliance of the used technologies with the tasks level; | - degree of scarcity in the latest technologies. |
|                         | - liquidity and solvency indicators; | - sufficient investment resources for the implementation of the company's projects; | - demand level for the manufactured products/services; |
|                         | - bankruptcy probability level. | - number of external investors; | - competitive position of the company in the industry; |
| Organizational          | - production process stability; | - amount of public investment; | - number of competitors. |
|                         | - fixed assets renewal pace; | - criteria for the investment projects efficiency. | |
|                         | - capacity utilization level; | Marketing | |
|                         | - availability of reliable suppliers and sales channels. | | |
| Social                  | - compliance of working conditions with safety and comfort standards; | Investment | |
|                         | - availability of employee social package | - number of external investors; | |
| Personnel               | - share of highly qualified personnel from the total number of employees; | - amount of public investment; | |
|                         | - level of cooperation with scientific organizations and attracting young specialists. | - criteria for the investment projects efficiency. | |
| Logistics               | - availability of necessary resources; | - demand level for the manufactured products/services; | |
|                         | - age structure and technical resource of the machine and equipment fleet. | - competitive position of the company in the industry; | |
| Environmental           | - negative impact on the environment; | - number of competitors. | |
|                         | - amount of payments for the pollution caused by the company's activities. | | |
| Innovative              | - degree of the enterprise science intensity; | | |
|                         | - number of implemented innovative developments; | | |

Fig. 3. Stages to improve the economic security level of innovative enterprises

Table 1: Decoding parameter group of the economic security level of an innovative enterprise

III. METHODOLOGY

To assess the economic security level of an innovative enterprise, it is advisable to use an integral indicator that takes into account all the factors that characterize the object security. The calculated overall assessment will allow you to draw conclusions about the existing risks and threats to the enterprise at the moment using a special scale.
It should be noted that the assessment scale is formed on the basis of the existing experience of an innovative enterprise and the requirements of its management.

To calculate the integral indicator, the management of an innovative enterprise needs to prioritize among the groups of characteristics in addition to the assessment scale and the set of threshold indicators, which will allow the most accurate assessment of the current level of economic security in accordance with the existing management goals [6, 17]. Quantitative characteristics within the groups of characteristics are assessed by comparison with threshold values, and qualitative characteristics are assessed using expert analysis. Based on the scores obtained for all characteristics within the submitted groups, conditional points are assigned that show the degree of compliance or non-compliance with the initial restrictions.

For the convenience of analyzing the results, it is advisable to build an analytical table, the form of which is shown in figure 4.

| Group of characteristics | Criteria | Values | Threshold value | Conditional point $S_m$ |Criterion weight within the group $W_m$ | Group priority $W_k$ |
|--------------------------|----------|--------|-----------------|------------------------|----------------------------------------|-------------------|

Fig. 4. Analytical form for filling in the assessment of economic security of an innovative enterprise

Thus, the formula for calculating the integral indicator of economic security of an innovative enterprise can be presented as follows:

$$I = \sum_{k=1}^{n} I_k \times W_k,$$

where $I$ – is the Integral indicator; $I_k$ – the index calculated by $k$ – group of characteristics; $W_k$ – the weight of $k$ – group of characteristics, which determines its priority.

Indexes for groups of characteristics are defined as follows:

$$I_k = \frac{\sum S_m \times W_m}{\sum W_m},$$

where $S_m$ – is the conditional point by $m$ – criterion in $k$ – group of characteristics; $W_m$ – is the weight of $m$ – criterion within $k$ – group of characteristics.

In this article, we consider an example of assessing the economic security level of an innovative enterprise. Table 2 presents the initial data for calculating the integral indicator of the economic security level. The criteria system is selected individually for the object under consideration, the threshold values are specified as guidelines by the company's management. The conditional points are placed by expert evaluation depending on the degree of separation from the threshold criterion. It is necessary to involve the company employees, who are directly related to the estimated indicators and have a high level of professionalism, as experts. The expert group should not be too large to avoid inconsistent results. Conditional points, weight of the criterion and group priority are formed by individually giving the points by each expert and bringing them to the general values by calculating the arithmetic averages. In this example, a ten-point scale was used, since the large bit depth makes the analysis process difficult.

IV. RESULTS

According to the results of calculations, we have obtained that the integral indicator of the level of economic security: $I = \sum_{k=1}^{n} I_k \times W_k = 7.72$.

To make definitive conclusions, it is necessary to apply the scale shown in figure 5.

Fig. 5. Scale for assessing the economic security level

According to the presented scale, the estimated innovative enterprise currently has a high level of economic security. This enterprise could receive an unsatisfactory assessment of the economic security level under the same conditions if the distribution of points, weights, and priority groups of characteristics differed from the example considered.
## Table II: The initial data for calculating the integral indicator of the economic security level

| Group of characteristics | Criteria                                               | Values | Threshold indicators | Conditional point $S_m$ | Criterion weight within the group $W_m$ | Group priority $W_k$ | Group index $I_k$ |
|--------------------------|--------------------------------------------------------|--------|----------------------|------------------------|-----------------------------------------|----------------------|------------------|
| **Financial-economic**   | Revenue volume (thous. rub.)                           | 8721972   | >5000000             | 10                     | 0,2                                     | 0,2                  | 6,25             |
|                          | Net profit volume (thous. rub.)                        | 667518   | >1000000             | 6                      | 0,3                                     |                      |                  |
|                          | ROA (%)                                                | 1,73    | >15                  | 1                      | 0,15                                    |                      |                  |
|                          | ROE (%)                                                | 7,72    | >15                  | 2                      | 0,15                                    |                      |                  |
|                          | Current liquidity ratio                               | 1,6084  | >1                    | 10                     | 0,1                                     |                      |                  |
|                          | Z score model                                         | 3,2973  | >3                    | 10                     | 0,1                                     |                      |                  |
| **Organizational**       | Fixed assets renewal pace                             | Once in 10 years | 8 years | 8 | 0,5 | 0,05 | 7,5 |
|                          | Reliable suppliers and sales channels (%)             | 70 | 80 | 7 | 0,5 |                      |                  |
| **Social**               | Compliance of working conditions with safety and comfort standards | yes | yes | 10 | 1 | 0,07 | 10 |
| **Personnel**            | Share of highly qualified personnel (%)               | 75 | 60 | 10 | 0,8 | 0,1 | 9,8 |
|                          | Share of young specialists (%)                        | 30 | 40 | 9 | 0,2 |                      |                  |
| **Innovative**           | Share of science intensive production (%)             | 25 | 30 | 8 | 0,3 | 0,15 | 7,4 |
|                          | Revenue from innovations implementation (thous. rub.) | 1308296 | >1500000 | 6 | 0,5 |                      |                  |
|                          | Funding in innovative projects (thous. rub.)         | 2374109 | >1000000 | 10 | 0,2 |                      |                  |
| **Compliance with strategic goals** | State orders per year                              | 3 | >5 | 6 | 0,2 | 0,15 | 7,6 |
|                          | Ratio of the plan and the actual results of the company's activities (%) | 80 | 90 | 8 | 0,8 |                      |                  |
| **Technological**        | Degree of scarcity in the latest technologies (%)    | 25 | 10 | 7 | 1 | 0,06 | 7 |
| **Investment**           | Number of internal investors                          | 7 | >4 | 10 | 0,2 | 0,13 | 7,5 |
|                          | State investment (thous. rub.)                        | 1661876 | >1000000 | 10 | 0,3 |                      |                  |
|                          | Share of profitable investment projects (%)          | 60 | 90 | 5 | 0,5 |                      |                  |
| **Marketing**            | Competitive position of the company in the industry  | high | high | 10 | 0,7 | 0,09 | 8,5 |
|                          | Number of strong competitors                         | 3 | <3 | 5 | 0,3 |                      |                  |

### V. CONCLUSION

To sum up, we can conclude that the proposed method of assessing the economic security level is applicable in real conditions and can serve as a tool for periodic monitoring of the state of the object under study. For further improvement of the considered tool, it is advisable to introduce additional indicative scales that allow you to clearly put down conditional points to the criteria depending on the percentage of distance from the threshold values. This will help reduce the likelihood of erroneous analysis results. However, it is impossible to eliminate the factor of subjective assessments, since expert analysis assumes them. This fact is a disadvantage of the proposed methodology for assessing the economic security level of an innovative enterprise.
In order to minimize the risk of erroneous judgments when conducting an analysis using the expert assessment method, it is expedient to devote further research to organization of analytical work. Studies are needed in the field of forming a group of experts, in justifying their professionalism and matching personal qualities to the assessment tasks. The accuracy of the results of the economic security level study will also depend on the quality of the preparatory activities and the conditions created for the specialists. The expediency of implementing the center of responsibility for organization of work on the analysis of threats and risks of economic activity of an innovative enterprise is due to the need for continuous assessment of economic security, which requires rapid interpretation of the results and immediate measures to eliminate negative trends when they are detected. The list of preliminary organizational measures should include the following:

1. Forming a center of responsibility for assessing the economic security level of an innovative enterprise. This structural unit should be part of the economic security system along with other responsibility centers for tracking threats to the enterprise. In addition, all incoming signals and information flows related to security must be accumulated in this center and processed. The heads of the economic entity distribute responsibilities and tasks and state the main goal of the analysis.

2. Collecting and processing basic information about the current activity of the innovative enterprise, competitors, opportunities and threats, as well as further providing data at the experts’ request in the course of their work.

3. Developing analytical forms and tables in documentary or electronic form. This event is necessary to ensure the convenience of the experts' work, as well as the efficiency of processing the study results.

4. Selecting specialists for the expert group. This stage requires special attention, since the reliability of the analysis results depends on the professional qualities of the experts. It is advisable to include in the expert group the professionals whose qualifications meet high requirements. This fact can be verified with the help of documentary assessment, namely when providing diplomas of education and other documents confirming the competence of the expert. In addition, there is a record of practical experience and work experience in the company under study, as well as the self-assessment method.

5. Conducting and controlling the work to assess the economic security level of the enterprise. This paragraph includes notifying and organizing the gathering of experts, informing them about the goals of the management and the tasks of the upcoming study, familiarizing them with the methodology for assessing the economic security level, and directly managing the expert analysis process.

6. Analyzing and generalizing the findings. Based on the analytical forms filled in by specialists, the corresponding calculations and interpretation of the results are made. At this stage, it is advisable to analyze the consistency of assessments by various experts. If there is a high percentage of discrepancy in estimates among experts, it is not advisable to bring the results to the arithmetic mean, but it is necessary to collectively discuss the study and repeat the work in stages until the minimum level of disagreement is reached.

7. Preparing a report on the work done. The management of an innovative enterprise needs to provide a structured document, the content of which should include: composition of the expert group; calculation table for assessing the economic security level, containing a system of selected indicators; evaluation scales; final integral indicator and conclusions. The conclusions of the study are based on the identified threats and negative trends. In addition, the report should include a list of proposals to improve the economic security level of the enterprise with the allocation of the expected responsible departments for these measures.

Speaking about the positive aspects of the proposed methodology for assessing the economic security level, it is worth noting the flexibility of the composition of groups and characteristics within them, which allows to adjust the assessment guidelines depending on the current goals of the company's management.

In case of detection of a low level of economic security of the enterprise or the presence of negative trends (decrease in the integral indicator), it is necessary to apply measures to eliminate negative facts. To do this, the following is required:

- identifying weaknesses in the company's activities. The report on the analysis of the economic security level, namely, the system of indicators, in which the indicators that do not meet the established threshold values should be selected, is suitable as an informative base for the work.

- forming a working group of specialists. This group should include professionals who are responsible for those areas of the enterprise development, in which shortcomings are found.

- searching for reasons for reducing the required results. The process is carried out by conducting detailed financial and investment analyses, marketing research, etc.

- generating solutions to problems. Creating scenarios for development of certain actions, forecasting future consequences, drawing up current and strategic plans.

Thus, the issues of ensuring economic security must be constantly investigated due to improvement of external threats and growth of competition. The formation of a stable economic security system will allow maintaining a high level of security of the innovative enterprise in conditions of uncertainty and risk.

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