

UDC 65.012.8(477)

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**FORMING OF SYSTEM EVALUATION ECONOMIC STRENGTH  
OF ENTERPRISE SECURITY TAKING INTO ACCOUNT INFLUENCE  
OF ENTERPRISE RISKS**

Investigational *vzaemopov'yazanist'* and *vzaemovpliv* of risks and economic security of enterprise. Influence of enterprise risks is appraised after the constituents of economic security. The sequence of integral estimation of economic strength of enterprise security is reflected.

**Key words:** enterprise risk, economic security, integral index, integral estimation, indicator of economic security.

**Problem statement.** Economic security of an enterprise is characterized by a complex of qualitative and quantitative indicators. The most important among them is considered to be the level of economic security, which can be evaluated from the point of view of both quality and quantity. The value of this indicator shows possibility of firm and maximally effective functioning of an enterprise at present stage of its development and growth potential in future. That is why to increase effectiveness of enterprises' activity elaboration of corresponding system of evaluation of economic security level of an enterprise taking into account entrepreneurial risk is needed.

**Analysis of the latest researches and publications.** Modern economic literature is limited only by superficial view to existing methods of evaluation of economic security of an enterprise and does not provide any concrete recommendations as to which of them it is better to use when one or another type of risk exerts influence.

No methods of evaluation of the level of economic security of an enterprise used individually give reliable results. Analysis of economic literature, namely scientific papers by Androschuk G. A., Arefyev O. V., Varnaliy Z. S., Voynarenko M. P., Gavrylyuk A. M., Donets L. I., Ivanyuta T. M., Kamlyk M. I., Kozachenko G. V., Lyashenko O. M., Oleynykov E. A., Ponomarev V. P., Yaremenko O. F., proved that most of scientific sources are dedicated to analysis of general methods of economic security evaluation, although expediency of their use taking into account the level of entrepreneurial risks' influence was not enough disclosed.

**Highlighting earlier unresolved components of general problem.** Most of native and foreign elaborations of methods of evaluation of the level of economic security are dedicated to economic security provision problems of a region and a state, and much less attention is paid to issues of enterprises' security. Due to enterprise economic security level evaluation one can analyze efficiency of enterprise's activity, identify its problems and prevent possible threats for business, which may arise if one or another risk takes place. That is why the elaboration of methods of evaluation of economic security taking

into account influence of entrepreneur risk is important in modern conditions, and this determines topicality of the scientific research and permits to formulate the objective and key tasks of the scientific article.

**Objective of the article.** The main objective of this paper is elaboration of the integral evaluation of the level of economic security of an enterprise and determination of sequence of its use taking into account entrepreneur risk influence.

**Statement of the basic material.** Analysis of basic methods of determination of enterprise economic security level [1, 2, 3, 4, 5] lets us to state that each of them has certain utilization limitations, and so does not permit full and precise determination of enterprise's present state. Namely, we should state that:

- variety of approaches to evaluation of economic security of an enterprise is stipulated by different objectives, which are stated during the evaluation;
- different groups and systems of indicators are sorted out in different methods, however indicators, which permit to evaluate such components of economic security as market, interface-power, legal, ecological ones, are absent;
- it is problematic to use the offered methods, as statistic data for calculations are absent;
- system of indicators is overloaded, that is a reason of difficulties and makes it more complicated to conduct evaluation. Great number of indicators does not increase exactness and reliability of evaluation.

That is why we offer to calculate integral index of economic security of an enterprise basing on evaluation of entrepreneur risk factors. The integral index serves for obtaining information about the state of enterprise's economic security in whole or about its components.

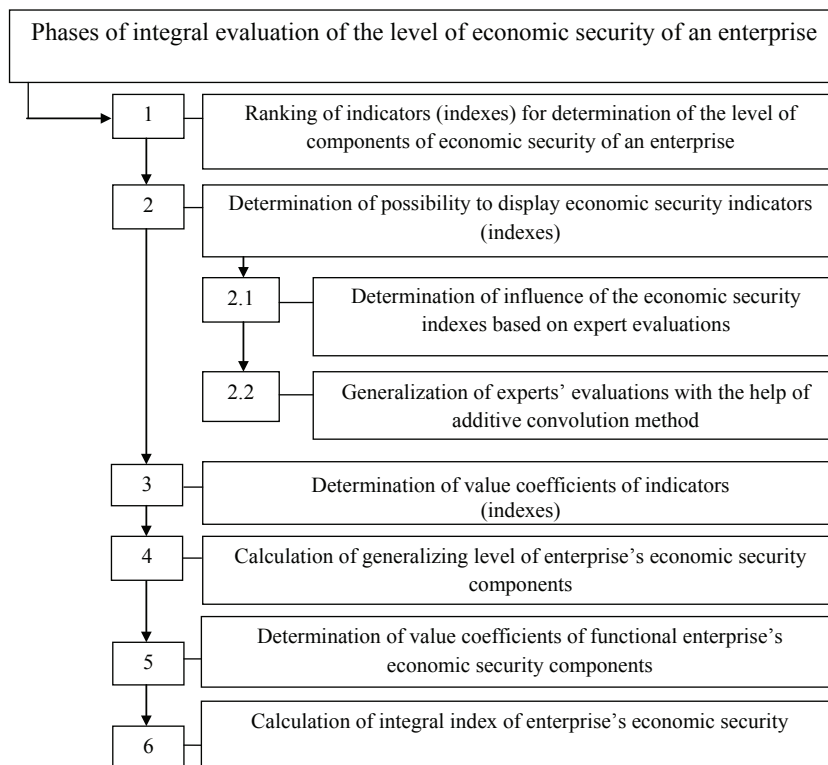
To put the conceptual framework of the research in order there is necessity to specify the essence of the term «economic indicator». As it originates from western science it is proper to address to its works first of all. The notion, described by this word combination, is defined by leading foreign publishers without considerable discrepancies. Some of economic reference books offer to consider economic indicator to be a series of strategic data, used by economists to analyze and forecast changes in economic activity. Short British encyclopedia interprets economic indicators as statistics used for identification of general economic activity state, especially for forecasting the future. Marketing dictionary defines economic indicators as indexes, which are determined on the basis of data, collected during a long period of time, and show business conditions and general economic activity [6].

In native scientific literature indicator if considered to be numerical value of change of economic value, which is used for grounding economic policy, direction of economic processes' development and evaluation of its results [7]. It is also necessary to point out that in modern economic literature along with the term "indicator" the term "index" is used. Some native authors try to differentiate between them, referring to their different subject matter. However, from the point of view of absence in the English language of linguistic analogue and insignificant in economic context peculiarities, which make the two mentioned words different, one can consider "indicator" and "index" as interchangeable notions, which may be equally used in scientific texts [6].

Considering the above stated, we offer to deal with the indicators – indexes of economic security of an enterprise – as with oriented economic measuring indexes, that give the opportunity to foresee in which direction one should expect development of economic processes.

Complex integral index of enterprise economic security is determined gradually, basing on account of entrepreneur risks' influence. We consider it proper to take into account the level of entrepreneur risk according to components of economic security as an index-indicator for determination of enterprises' economic security level. The system of indexes-indicators, which obtained quantification, permits to give warning of insecurity and to use preventive measures against it beforehand. The offered methods are constructed from calculation of 10 partial indicators (components) of economic security, divided into 6-10 groups of indexes, represented by risks of influencing enterprise's security and determined by integral index of enterprise's economic security. Each of the offered indicators is composed of the most important factors of entrepreneur risks, which reflect particular directions of risks' influence and form stability of enterprise's activity.

That is why we offer to calculate integral index of enterprise's economic security on the following phased basis shown in fig.1.



**Fig. 1. Phases of integral evaluation of the level of economic security of an enterprise\***

*\*elaborated by the author with the use of the sources [6, 8]*

At the first stage of determining enterprise's economic security a set of indicators, which shall be used for evaluation of functional components of economic security, is selected.

Viewing economic literature on the issues of economic security [4, 7, 8] has shown that in the most of methods the main attention is paid only to researching financial indexes, which are present in official financial accounting. In our opinion, financially oriented systems of indexes – indicators do not embrace the complexity of processes of enterprise's economic security management. Financial indexes describe considerable quantity, but still not all the processes of enterprise's activity, provide one-way direction and interfere with adequate actions as to provision of enterprise's economic security.

To evaluate the state of economic security known statistic indicators and classic dependencies are used. However, cyclic nature of market development with deep, hardly forecasted crises, especially of the last ten years, conditions necessity of elaboration and utilization of specialized systems of indexes-indicators, which research business environment and give the opportunity to form the notion about arising threats timely for successful activity of an enterprise.

Elaboration of the effective system of indicators of economic security is a complicated methodological problem, as, according to Gutman V.G. [9, p. 75], their quantity and quality must be enough for timely and adequate warning about arousal and development of destabilizing tendencies in economics, at the same time without overloading the system of economic security, which is constructed for error-free and prompt reaction to possible threats.

In our opinion, basic principles in the process of forming the system of indexes-indicators of enterprise's economic security should be simplicity of conduct, promptness of calculations and balance of selected indexes-indicators.

While forming the system of indicators-indexes it is necessary to take into account their independence (absence of functional or close relationship among criteria), fullness (account of all qualitative characteristics of a subject), informational content (alterability of criteria values in time and space), calculability (determination of types of scales of criteria measurement) and stability (invariability of criteria system components for comparing official's evaluations in terms of strategy).

To carry out this procedure we offer to use qualitative analysis of ranking factors of risks of light industry enterprises according to the following economic security components shown in table 1.

At the second phase probability of indicators of economic security of an enterprise is determined. The most spread method, used in the process of evaluation, is the method of expert evaluation, based upon which the necessary information concerning entrepreneur risks, which may threat activity of enterprises of light industry, is obtained according to the results of processing and generalization of the ideas of experienced entrepreneurs or specialists.

To obtain detailed information regarding risks, which are the most important in the activity of enterprises of light industry, and determination of the power of such influence, it is necessary to use the method of expert evaluations based on questionnaire survey.

Table 1

**Determination of enterprise's economic security based  
on factors of entrepreneur risks**

Factors of entrepreneur risks according to components of enterprise's economic security	
Financial component	Interface-power component
Risk of changing prices for basic stores, materials, energy resources, etc. Risk of reduce of financial firmness of an enterprise (of profitability, productivity, absolute and current liquidity, etc.) Risk of change of cost of financial instruments Risk of debtor's delay or fail to pay debts Risk of impossibility to repay loan Risk connected with change of exchange rate Risk connected with change of price for equipment Risk connected with falling of purchasing capacity of money Risk connected with depreciation of assets of an enterprise, floating funds' scarcity Risk connected with purchaser's inability to pay	Risk of possible unforeseen changes of conditions of interaction with economic counter-agents Risk of raiding at enterprise Risk of physical and moral influence on enterprise's management board Risk of physical and moral influence on enterprise's leading specialists Risk of fall of reputation of enterprise's management board Risk of enterprise's business reputation fall Risk of loss of enterprise's property, thefts Risk of encroachment on property and assets of an enterprise Risk of loss of economic independence of an enterprise
Technical and technological component	Professional component
Risk of appearing competitors with new, less expensive production technology Risk of not paying attention to innovations' implementation, encouraging measures from state regarding inventions and rationalization Risk of not paying attention to innovations' implementation, encouraging measures from enterprise's managers regarding inventions and rationalization Risk connected with inefficiency of innovative activity of an enterprise Risk connected with absence of technological changes Risk connected with unscheduled equipment downtime Risk of irrational utilization of production facilities	Risk connected with excess/lack of workers Risk connected with professional disability of personnel Risk connected with «intergenerational conflict» (staff according to age) Risk connected with safety rules violation, damaging personnel, breach of discipline Risk of increase of number of working pensioners among enterprise's personnel Risk of high level of traumatism at work Risk of loss of qualified workers, key co-workers' leaving enterprise Risk of insufficient growth of wages Risk of growth of arrears of wages Risk of insufficient quality of management or of "management board"
Resource component	Ecological component
Risk of delayed supply with basic types of resources Risk of irrational utilization of basic stores and materials Risks of inability to substitute resources Risk of efficiency of resources' realization Risk of unfair resource planning Risk of achieving production competitiveness Risk of procurement of own resources Risk of stability of demand for production	Risk connected with hazardous conditions at production Risk connected with emergency or hazardous situations Risk connected with exceeding tolerable limit of concentration of pollutant emissions Risk connected with pollution of environment Health risk of enterprise's employees because of working conditions' incompliance with those of existing norms Risk of insufficient compliance of ecological compatibility of production results with approved normative acts

Intellectual component	Informational component
Risk of unauthorized use of intellectual property of an enterprise with a mercenary motive Risk of stealing designer's ideas Risk of loss of intellectual property by an enterprise Risk of moral depreciation of intellectual property Risk of absence of creative type of thinking, professionalism of workers Risk of insufficient intellectual potential for investing Risk of reducing demanded value of engineer-technical workers and scientists within total number of workers Risk of reducing rationalizing and inventing activity	Risk of lack or insufficiency of economic researches and use of their results Risk of insufficient level of provision of information necessary for operation as to its volume, quality and timeliness Risk of mistake at the stage of collecting information Risk of disclosure of confidential information Risk of reducing quality of information Risk of unauthorized actions regarding destruction, misrepresentation, blocking of information Risk of data forgery Risk of external and internal attacks of information security of an enterprise Risk of gaining possession of information mediums
Legal component	Market component
Risk connected with strikes, public disturbances Risk connected with alteration of prices for electricity Risk connected with alteration of political situation in the country Risk connected with relations with authorities Risk connected with political peculiarities of region where production is situated Risk connected with unplanned limitations from state of economic activity of an enterprise Risk of violations of legal rights of workers and enterprise Risk of raising penal sanctions Risk of raising interest rates, uncontrolled money emission, inflation processes, instability of currency and financial policy	Risk of reducing of market segment taken by an enterprise Risk of weakening of competitor positions and ability to counteract competitor pressure Risk of reducing adaptive abilities of an enterprise for changes of market situation, lagging behind market requirements Risk of alteration of present and quality information about competitors, suppliers Risk of absence or insufficiency of marketing researches and use of their results Risk connected with underestimation of competitors' abilities Risk of unsuccessful positioning of production at market Risk of loss of funds as a result of change of national currency unit Risk of lowered demand for production

To generalize experts' evaluations we use the method of additive convolution of indicators, which is used in case when the indicators are independent in their value and they may be measured in quantitative terms.

The value of relative possibility of influence of indicators is determined by the following formula:

$$V_i = \frac{\sum_{j=1}^m a_{ij}}{\sum_{i=1}^n \sum_{j=1}^m a_{ij}}, \quad (1)$$

where  $a_{ij}$  – is value of  $i$  indicator in points, given by  $j$  expert to  $i$  – value of index;

$j$  expert's index;

$i$  – criterion's index;

$n$  – number of indicators;

$m$  – number of experts.

The third phase consists in allotment of value coefficients to indicators of economic security. Value coefficient is numerical relative indicator, which characterizes level of value or importance of its manifestation at enterprise's activity. The fact, that level of influence of specified factors to aggregate result is controversial, is well-known.

For effective management of enterprise's activity, taking into account in-



fluence of risks to its economic security, there arises necessity to conduct preliminary ranking of risk factors for excluding insignificant ones or those which have no influence, with the help of determination of value coefficients of importance of enterprise's economic security indicators. On condition of fragmentariness of theoretical researches in this field and considerable uncertainty of environment for resolving the task set we offer to evaluate factors of entrepreneur risk as compared to value of factors of threats, which more or less influence enterprises activity.

Basing on expert evaluation one selects informational risk factors for financial-economic activity of an enterprise and determine their value coefficients.

At the fourth phase level of each component of enterprise's economic security is determined. Calculation of integral indicator for each sphere is carried out according to the following scheme:

$$l_j = 1 - R_i, \quad (2)$$

where  $l_j$  – is integral indicator of enterprise's economic security component;

$R_i$  – generalizing level of i component of enterprise's economic security, which is calculated according to the formula:

$$R_i = \frac{\sum_j v_{ij} \cdot w_{ij}}{n_i}, \quad (3)$$

where  $v_{ij}$  – is value coefficient of i indicator, given by j expert to i value of indicator;

$w_{ij}$  – is possibility of manifestation of i indicator, given by j expert to i value of indicator;

$n_i$  – number of levels of i component of economic security.

As there is inverse dependence between the level of entrepreneur risk at the i component of economic security and economic security of an enterprise – improvement of entrepreneur risk level reduces level of economic security, and vice versa – it is necessary to find difference between the highest value of generalized evaluation of level of i economic security component and calculation value of security component.

Correspondingly, normalization of indexes-indicators is carried out by this action, and it represents transition to such measurement scale, at which «the best» value of the index is 1, and «the worst» – is 0, as risks are de-stimulating for enterprise's economic security.

At the fifth phase concretization of value coefficients of enterprise's economic security components, which show relative importance of the corresponding component of enterprise's economic security in general aggregate of components, is carries out. They are determined by way of ranking enterprise's economic security components with their obtaining of searched values in parts of one. To determine the value coefficients one may use: expert evaluations' method, correlation analysis methods, method of graphs and other economic and mathematic methods. However, use of the specified methods is complicated by the fact that value coefficients of standard unit indexes in conclusive evaluation of enterprise's economic security are not subject to

direct measuring by any of the mentioned above methods. In connection with this, use of expert evaluations methods is prospective. Expert evaluation of value coefficients of enterprise's economic security was carried out basing on questionnaire.

At the sixth phase basing on the offered methods integral index of enterprise's economic security is determined, and it is calculated by the formula:

$$I = \sum_{j=1}^n l_j \cdot d_j, \quad (4)$$

where  $d_j$  – is value coefficients of enterprise's economic security components.

At that,  $d_j$  satisfies the following conditions:  $0 \leq d_j \leq 1$ , a  $\sum d_j = 1$ . Integral indicator of specific component of economic security acquires the best «optimal» value, when  $l_j=1$ , and the worst value, when  $l_j=0$ . If the level of risk as to a certain component of economic security is absent, value of other component of enterprise's security correspondingly increases, which in the whole excludes influence on values of general level of integral index of enterprise's economic security.

Thus, the process of provision of economic security of an enterprise can be considered as the process of prevention of losses from negative actions according to various directions of financial-economic activity by evaluating real and potential internal and external factors of entrepreneur risks, which are an unalienable component of activity of any enterprise.

The offered evaluation of economic security of an enterprise embraces all of the most important aspects of management activity, excludes duplication of separate indexes, and gives the opportunity to see the state of enterprise's security level clearly. The examined methods have clear advantages and can also be used by enterprises for internal evaluation of their security, aiming at identifying the strong and the weak positions of the enterprise. Integral index gives the opportunity to evaluate economic security both dynamically and at certain period of time. I.e. the main issue of all generally accepted indexes is resolved – imperfection of statistic calculations – based upon which it is impossible to make reasonable conclusions regarding worsening or improvement of financial-economic state of an enterprise. Such approach permits to compare different types of enterprises of specified branch.

Basing on the conducted analysis, using the method of expert evaluation, we offer to point out the following levels of economic security of an enterprise: high, medium, satisfactory, low and critical (table 2).

The highest level of security is achieved on condition that all the complex of indicators is within the limits of admissible interval of threshold values, and threshold values of one index are achieved regardless of others. Admissible level of entrepreneur risk can not be achieved simultaneously as to each component of enterprise's economic security. Risks have proper level as to some components of economic security, and as to others – they don't.



Table 2.2

**Characteristics of economic security levels of an enterprise based on evaluation of influence of entrepreneur risks**

Levels of economic security of an enterprise	Indexes of levels of economic security of an enterprise	Characteristics of enterprise's state according to determined level of economic security
High	$0,8 < l < 1$	Level of influence of entrepreneur risk on state of economic security of an enterprise is minimal (threats to economic activity are almost absent). Management may be limited to analyzing the level of economic security, monitoring possible risks, determining priority directions of further development of the enterprise.
Medium	$0,6 < l \leq 0,8$	Moderate level of entrepreneur risk influence on the level of economic security of an enterprise permits to provide stable development of the enterprise. Realization of management measures should be aimed at promoting separate components of enterprise's economic security.
Satisfactory	$0,4 < l \leq 0,6$	Admissible level of risk influence on enterprise's economic security state, characterized by high probability of losses, which do not exceed the amount of expected profit, i.e. the enterprise may get loss as well as profit.
Low	$0,2 < l \leq 0,4$	Critical level of risk influence on economic security state – possible amount of losses, for which an enterprise may not only gain profit, but also lose all funds, invested into economic activity. High possibility of loss of financial capacity.
Critical	$0 < l \leq 0,2$	The state of economic security of an enterprise under influence of catastrophic risks characterizes activity when possible losses exceed profit and can reach the value, which equals property status of the enterprise. The enterprise is financially incapable.

**Conclusions and recommendations.** Thus, the level of entrepreneur risks is the key instrument of influence on the level of enterprise's economic security, which evokes the necessity of elaboration of an effective mechanism of entrepreneur risk management in the system of economic security of an enterprise, which will give to an enterprise the opportunity to provide efficient management decision making, aimed at minimizing or avoiding risk influence on enterprise's activity, and thus to achieve high level of its economic security.

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**ФОРМУВАННЯ СИСТЕМИ ОЦІНЮВАННЯ РІВНЯ  
ЕКОНОМІЧНОЇ БЕЗПЕКИ ПІДПРИЄМСТВА  
З УРАХУВАННЯМ ВПЛИВУ ПІДПРИЄМНИЦЬКИХ РИЗИКІВ**

**Резюме**

Досліджено взаємопов'язаність і взаємовплив ризиків та економічної безпеки підприємства. Оцінено вплив підприємницьких ризиків за складовими економічної безпеки. Висвітлено послідовність інтегральної оцінки рівня економічної безпеки підприємства.

**Ключові слова:** підприємницький ризик, економічна безпека, інтегральний індекс, інтегральна оцінка, індикатор економічної безпеки.

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**ФОРМИРОВАНИЕ СИСТЕМЫ ОЦЕНКИ УРОВНЯ  
ЭКОНОМИЧЕСКОЙ БЕЗОПАСНОСТИ ПРЕДПРИЯТИЯ  
С УЧЕТОМ ВЛИЯНИЯ ПРЕДПРИНИМАТЕЛЬСКИХ РИСКОВ**

**Резюме**

Исследовано взаимосвязь и взаимовлияние рисков и экономической безопасности предприятия. Оценено влияние предпринимательских рисков за составляющими экономической безопасности. Изложено последовательность интегральной оценки уровня экономической безопасности предприятия.

**Ключевые слова:** предпринимательский риск, экономическая безопасность, интегральный индекс, интегральная оценка, индикатор экономической безопасности.