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**ANALYSIS OF INDICATORS IMPACT ON ECONOMIC SECURITY OF ENTERPRISES IN THE CONTEXT OF SOCIO-HUMANITARIAN COMPONENTS**

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**Introduction.** The level of economic security of enterprises is characterized by many indicators. The assessment of the state of economic security of enterprises is carried out through a system of criteria and indicators. The criterion of enterprises economic security is a measure of the state of the entity in terms of compliance with the established indicators of its activity with pre-established indicators reflecting the essence of economic security. Therefore, the problem of analyzing indicators of enterprises economic security and developing measures to improve their economic component in the context of the socio-humanitarian component.

**Aim and tasks.** Justification of the need to develop measures to improve the assessment of economic security of enterprises based on the impact of indicators in the context of the socio-humanitarian component. On the basis of this goal, the question arises of solving such problems as: the possibility of developing a unified conceptual approach and tools for assessing the impact of indicators on the organization's economic security; developing measures to improve the economic component of enterprises in the context of the socio-humanitarian component.

**Results.** For the analysis of the economic security state, indicators were chosen that characterize economic security in different spheres of enterprise activity according to the recommendations. For each indicator a matrix of values with the enterprises and indicators of values by years was formed. The analysis uses a multidimensional logit model, a case of binary selection. The model does not take into account group effects, that is, there is no analysis of fixed effects. In order to avoid cross-effects, when not only the variable itself influences the likelihood of a crisis, but the public crisis begins to affect the behavior of the variable, two groups of models are built: for the first group of regressions from the sample, all observations after the first year of crises are excluded; for the second group of regressions all data were used except for the crisis years after the first year of the crisis.

**Conclusions.** Based on the analysis of the investigated indicators and the determination of the parameters of enterprises economic security in addition to economic methods, administrative and socio-psychological means can be used. They include methods of influencing individual workers, groups of employees or the collective as a whole to form a corporate culture that will help achieve the goals of this enterprise, will reduce the impact of socio-humanitarian factors of economic security on the enterprise. These methods include: training staff rules of safe behavior; work with managers, whose behavior serves as a reference for the company's staff; development of a program of work with new employees and its implementation; formation and adjustment of traditions of the enterprise; regulation of interpersonal and intergroup relations; moral encouragement; social planning; other methods. Quick methods for certain enterprises were also proposed to improve the economic component of their operation.

**Key words:** economic security, indicators, criteria, socio-humanitarian component, socio-economic system.

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## АНАЛІЗ ІНДИКАТОРІВ ВПЛИВУ НА ЕКОНОМІЧНУ БЕЗПЕКУ ПІДПРИЄМСТВ В КОНТЕКСТІ СОЦІОГУМАНІТАРНОЇ КОМПОНЕНТИ

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**Вступ.** Рівень економічної безпеки підприємств характеризується багатьма індикаторами. Оцінка стану економічної безпеки підприємств здійснюється через систему критеріїв та показників. Критерій економічної безпеки підприємств – це вимірник стану суб'єкта господарювання з точки зору відповідності фактично досягнутих показників його діяльності встановленим індикаторам, що відображають сутність економічної безпеки. Тому особливості актуальності набуває проблематика аналізування індикаторів економічної безпеки підприємств та розроблення заходів щодо покращення їх економічної складової в контексті соціогуманітарної компоненти.

**Мета та завдання.** Обґрунтування потреби у розробленні заходів щодо покращення оцінювання економічної безпеки підприємств на основі впливу індикаторів в контексті соціогуманітарної компоненти. На основі поставленої мети виникає питання вирішення таких завдань, як: можливість вироблення єдиного концептуального підходу та інструментарію оцінювання впливу індикаторів на економічну безпеку організації; розроблення заходів щодо покращення економічної складової підприємств в контексті соціогуманітарної компоненти.

**Результати.** Для аналізу стану економічної безпеки обрано індикатори, на основі яких сформовано матрицю значень з підприємствами та значеннями індикаторів по роках. При аналізу використано багатовимірну logit модель, випадок бінарного вибору. Модель не враховує групові ефекти, тобто немає аналізу фіксованих ефектів. Для того, щоб уникнути перехресних ефектів, коли не як сама змінна впливає на ймовірність появи кризи, а державна криза починає впливати на поведінку змінної, будуються дві групи моделей: для першої групи регресій з вибірки виключаються всі спостереження після першого року криз; для другої групи регресії використовувалися всі дані за винятком кризових років після першого року кризи.

**Висновки.** На основі аналізу досліджуваних індикаторів та визначення параметрів економічної безпеки підприємств в доповнення до економічних методів, можна використовувати адміністративні і соціально-психологічні засоби. Вони включають методи впливу на окремих працівників, груп працівників чи колективів в цілому для формування корпоративної культури, що буде сприяти досягненню цілей даного підприємства, дозволить зменшити вплив соціогуманітарних чинників економічної безпеки на підприємство. До таких методів відносять: навчання персоналу правил безпечної поведінки; робота з керівниками, поведінка яких служить еталонною для колективу підприємства; розробка програми роботи з новими співробітниками і її впровадження; формування і корегування традицій підприємства; регулювання міжособистісних і міжгрупових відносин; моральне заохочення; соціальне планування; інші методи.

**Ключові слова:** економічна безпека, індикатори, критерії, соціогуманітарна компонента, соціоекономічна-система.

**Introduction.** Economic security of enterprises is characterized by a combination of conditions and socio-humanitarian factors, in which the protection of economic interests and the maintenance of socio-economic parameters within the normative values are ensured, which makes the national economy retain the ability to satisfy the needs of entrepreneurial structures in the long-term regime [1]. The economic security system of modern socio-economic systems is a dynamic characteristic of the expedient and rational structure of their capital and constituent components of economic resources (tangible and intangible), the interaction of which minimizes the risks of their use (implementation) in the internal processes and external transactions, and ensures the ability of the enterprise to function in a sustained way in coordinates of the modern socio-economic environment. That is, "indicators of economic security not only give the opportunity to quantify the parameters of the necessary development of the economic system, but also formulate qualitative requirements that are, in essence, the goals of economic security"[2, p. 97].

The level of economic security of enterprises is characterized by many indicators. The assessment of the state of economic security of enterprises is carried out through a system of criteria and indicators. The criterion of economic security of enterprises is a measure of the state of the entity in terms of the correspondence of the actual achieved indicators of its activity with pre-established indicators reflecting the essence of economic security.

Financial and economic crises, socio-humanitarian factors and bankruptcy cases of modern companies cause significant problems in the formation of managerial decisions aimed at ensuring the economic security of enterprises. On the basis of the aforementioned, the problem of analyzing indicators of economic security of enterprises and developing measures to improve their economic component in the context of the socio-humanitarian component becomes particularly relevant.

**Actual scientific researches and issues analysis.** Assessing the economic security level, much attention has been paid to research in both domestic and foreign publications, namely: S.B. Dovbnia, N.Iu. Hihova [5], B. Hrekhem [6], S.M. Illiashenko [7], H.B. Kleiner [8], Z. Yakubovych [9], K. Neu [10], V.M. Chubai, Z. Yakubovych [11], and others.

Vast majority of research offers versatile indicative approaches to the development of methods for assessing the economic security level of the modern company.

However, as O. L. Reznikov notes "the application of the indicative approach to the study of the economic security level of the enterprise requires high accuracy of the values of the relevant indicators, for today there is not a proper methodological basis for a clear definition of indicators that would enable to take into account all the nuances of the financial and economic activity of the entity" [12, p.11].

The dominant position of scientists regarding the higher reliability of the assessment of the level of economic security is measured using methods based on the definition of an integrated indicator. However, as the conclusion of L. Matviychuk, "these methods are non-systemic, have some inaccuracies and differences" [13, p. 9].

Selection of previously unresolved issues. Despite a significant number of publications, their scientific and practical importance, a number of issues regarding the assessment of the impact of indicators on the economic security of the enterprise in the context of the socio-humanitarian component remains open. At present, the standard parameter of quantitative and qualitative methods of objective assessment of the economic security level of the organization and rapid measures to improve the economic component of their functioning has not been formed. The basic issue of this subject area of knowledge remains the question of the possibilities of developing a common conceptual approach and tools for assessing the impact of indicators on economic security,

the feasibility of formulating the boundaries of such a paradigm, given that the overwhelming majority of criteria for this type of assessment in a particular case have different meanings and extent of influence on the enterprise in the context of the socio-humanitarian component.

**Aim and tasks.** The goal of the article is to justify the need to develop measures to improve the assessment of economic security of enterprises based on the impact of indicators in the context of the socio-humanitarian component.

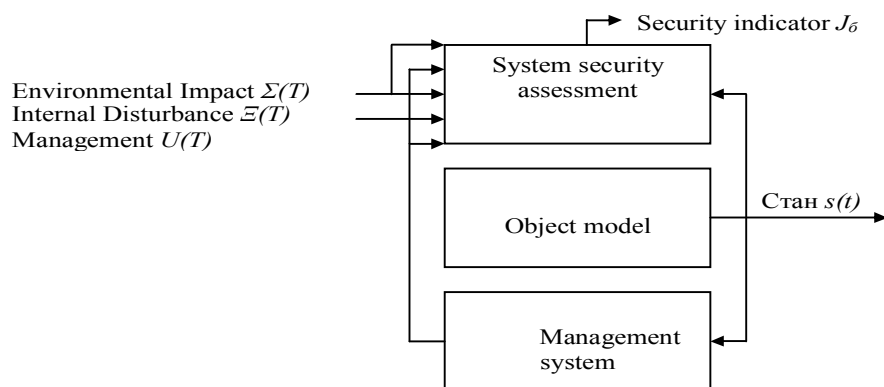
The statement of basic materials. The activity on ensuring the economic security of an enterprise is determined by the necessity of state regulation of markets with signs of dominance and oligopoly, on the one hand, since competition development has a higher potential for economic growth, and, on the other, a reduction of the possibility of abuses and anticompetitive concerted actions on the market. The ineffectiveness of the state

regulation system of industry competition produces an increase in market vulnerability to threats and a decrease in their economic security, institutional indicators of which are indicators that characterize the extent of the state's influence on entrepreneurial activity and its guarantees for the development and protection of competition [14, p.75].

The general task of forming an assessment of the economic security of the system is to develop such an assessment, through which the process of the system quantitatively threatens the destruction of the system for timely taking measures to prevent it. Such an assessment can be obtained using the parameters of the trajectory of the system's motion in the form of a functional:

$$J_{\sigma} = J_{\sigma}(t, s, u, \sigma, \xi), \quad s \in S, u \in U, \sigma \in \Sigma, \xi \in \Xi \quad (1)$$

The basic scheme of formation of safety index  $J_{\sigma}$  on the basis of all information flows in the system is shown in Fig. 1.



**Fig. 1 Scheme of the assessment formation of enterprise economic security**

To find it, we divide the space of states of the system into two regions, which describe the complete set of all states of the system:

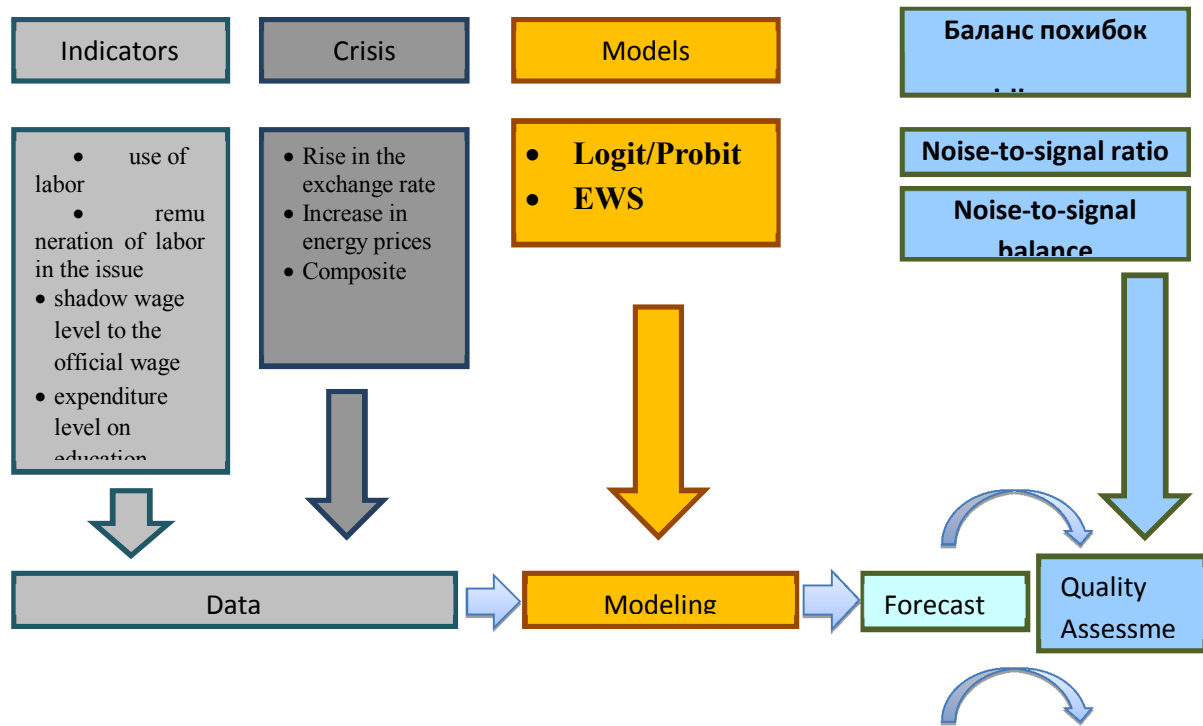
$$S = S_o \cup S_{\sigma} \quad (2)$$

where  $S_o$  is a set of dangerous states of the system existence;  $S_{\sigma}$  is a set of all safe states.

Then the problem is reduced to the construction of the set  $S_{\sigma}$ , which in its turn means the need to find the boundary of this

set of  $G_b$ , which contains all information about the security of the system. In this case, the security rate of  $G_b$  is a measure of the deviation of the current state of the system  $S$  from the boundary  $G_b$ . [15].

To analyze the state of the enterprises economic security of Ternopil region in the context of the socio-humanitarian component, the following scheme was used (Fig. 2) and Table. 1



**Fig. 2. A generalized scheme of indicators analysis of enterprises economic security in the context of the socio-humanitarian component**

Note: source [16, p.75].

As can be seen from Fig. 2. for the analysis of enterprises economic security, indicators were chosen that characterize economic security in various spheres of enterprise activity according to the recommendations, adapting them to the enterprises of Ternopil region. For each indicator a matrix of values with the enterprises and indicators of values by years has been formed. The filling of the matrix with the indicators is different, since it has not been possible for all enterprises to obtain certain indicator values. When analyzing the factors of economic security it is necessary to assume how a certain factor affects the economic security of an enterprise - leads to its growth or reduces the security of the enterprise. These assumptions are given in Table 1.

To analyse the enterprises economic security, a multidimensional logit model has been chosen, a case of binary choice. The model does not take into account group effects, that is, there is no analysis of fixed effects. Multivariate logit model for case of binary selection:

$$Y_{it}^* = \beta'x_{it} + \varepsilon_{it},$$

$$Y_{it} = \begin{cases} 0, & \text{если } Y_{it}^* \leq 0 \\ 1, & \text{если } Y_{it}^* > 0 \end{cases}, (3)$$

where is a binary dependent variable that takes value 1, if in the moment of time the enterprise has a crisis state, and 0 otherwise, are explanatory variables, is a random error,  $t = 1 \dots Ti$ ,  $a i = 1 \dots n$ .

We give in formula (2) the function of logistic distribution of probabilities.

$$F(\beta'x_{it}) = \Pr(Y_{it} = 1 | x_{it}, \beta) = \frac{e^{\beta'x_{it}}}{1 + e^{\beta'x_{it}}}, (4)$$

Estimation of the parameters by the method of maximum likelihood formula (5):

$$\ln L = \sum_{t=1}^T \sum_{i=1}^n [Y_{it} \ln\{F(\beta'x_{it})\} + [1 - Y_{it}] \ln\{1 - F(\beta'x_{it})\}] \longrightarrow \max$$

Interpretation of coefficients:

Where “+” – the variable is increasing => the probability of the crisis grows; “-” – the variable is increasing => the probability of the crisis decreases; – the coefficient shows the effect of the change of the exogenous variable on.

**Table 1. Hypotheses of the indicators impact on the enterprises economic security in the context of the socio-humanitarian component**

	Indicators	Sign of influence		Indicators	Sign of influence
	<b>Risk indicators of the socio-human component of the enterprise economic security</b>			<b>Indicators of development</b>	
ICr1	labor utilization level	+	IV1	efficiency of financial and economic activity of enterprises	+
ICr2	remuneration level in the issue	+	IV2	resource utilization efficiency	+
ICr3	shadow wage level to the official wage	-	IV3	flow capacity of production	-
ICr4	shadow employment level to total employment	-	IV4	competitiveness of products	+
ICr5	expenditure level on education	+	IV5	investment activity level	+
ICr6	expenditure level on health care	+	IV6	investment activity level	+
ICr7	ratio of the subsistence minimum to the average wage	-	IV7	stability of the legislation in the sphere of small business	+
ICr8	share of wages in the structure of enterprises net income	+		<b>Additional indicators</b>	
ICr9	level of pension expenditures	-	II1	legal incentive index	-
			II2	False variable = 1, if the account balance of the enterprise is negative for more than 2 years	+
	<b>Indicatorsofeconomicinde pendence</b>				
IL1	enterprise resource availability level, potential	+			
IL2	resourcefulness of production	+			
IL3	depreciation of the material and technical base of enterprises	-			
IL4	level of provision of enterprises with scientific potential	+			
IL5	level of provision of enterprises with industrial and technical potential	+			

In order to avoid cross-effects, when not only the variable itself influences the likelihood of the crisis, but the public crisis begins to affect the behavior of the variable, two groups of models are built:

- for the first group of regressions from the sample, all observations after the first year of crises are excluded;

- for the second group of regressions a sample was taken according to the same principle: all observations after the first year of the crisis were excluded and all observations after the end of the crisis were added to it, that is, all the data was used except for the years of crisis after the first year of the crisis.

Based on our research, we have drawn the following conclusions: Economic security is reduced in the context of a weak socioeconomic environment, with low GDP growth rates and high inflation; the growth of the exchange rate increases the likelihood of a

crisis in enterprises and a decrease in social protection, respectively; enterprises of the Western region mainly produce products for the consumer sector, therefore, socio-humanitarian factors are decisive.

Next, a global assessment of the indicators impact on the enterprises economic security has been carried out using logit and probit functions.

When checking the stationary non-stationary variables were: ICr 1, ICr 2, ICr 7, IL1, IL6, IV7. The stationary variable indicates that it is predictably changing over time. Non-stationary factors need to be further explored, since direct dependence on them of economic security is not established, as it is impossible to predict their change in time with a high degree of certainty.

When checking stationary non-stationary variables were: ICr 1, ICr 2, ICr 7, IL1, IL6, IV7. The linear form of the model appears as follows (Fig. 3).

Conditional fixed-effects logistic regression	Number of obs	=	294
Group variable: IDCode	Number of groups	=	27
	Obs per group: min	=	6
	avg	=	10.9
	max	=	14
Log likelihood = -62.693942	LR chi2( 5)	=	31.58
	Prob > chi2	=	0.0000

Y2	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
DIL1	-9.77678	5.781843	-1.69	0.091	-21.10899	1.555424
ICr10	-.1416409	.0484753	-2.92	0.003	-.2366507	-.0466311
IL7	.0065406	.0027356	2.39	0.017	.0011789	.0119023
IV1	-.7645714	.28408	-2.69	0.007	-1.321358	-.2077849
IV4	.0296845	.0110367	2.69	0.007	.0080531	.051316

**Fig. 3. Linear form of the model for non-stationary factors**

Source: calculated by the author

When analysing selected indicators and activities of Ternopil enterprises, it has been established that the determining factors are socio-humanitarian factors and financial state in the country. Important development factors for enterprises are effective advertising and long-term stay in the market with the support of their own products. Such

enterprises are more economically protected from the point of view of economic security, since their activities are carried out in the consumer sector. Quick methods for improving the economic component of their operation were also proposed for certain companies.

**Table 2. Development of measures to improve the economic component of enterprises**

Event title	LLC "TERNOPILBUD"	PJSC "TERNOPILGAZ"	BILLERBEC UKRAINE FEATHER AND DOWN FACTORY	LLC "RUTA-PHARM" FIRM	LLC "DOBROBUD"	PJSC "AGRO-PRODUCTS"	PE "PRODEXPORT"	PJSC "TERNOPIIL DAIRY FACTORY"	LLC "BUCHATSKYI SYRZAVOD"	LLC "TERNOPIILHIBPROM"
Website development	+	+	+	+	+	+	+	+	+	+
Conducting an advertising campaign, participating in exhibitions and fairs	+	+	+	+	+	+	+	+	+	+
Opening a branded store, own distribution network	-	-	-	+	-	+	+	+	+	-
Carrying out marketing researches	+	+						+	+	+
Timely execution of contracts	+	+	+	+	+	+	+	+	+	+
Development of new products and expansion of assortment	+	+	+	+	+	+	+	+	+	+
Improving the quality of service		+								

**Conclusions.** Based on the analysis of studied indicators and the parameters determination of enterprises economic security in addition to economic methods, administrative and socio-psychological means can be used. They include methods of influencing individual workers, groups of employees or the collective as a whole to form a corporate culture that will help achieve the goals of this enterprise, will reduce the impact of socio-humanitarian factors of economic security on the enterprise. These methods include: training staff rules of safe behavior; work with managers, whose behavior serves as a reference for the company's staff; development of a program of

work with new employees and its implementation; formation and adjustment of traditions of the enterprise; regulation of interpersonal and intergroup relations; moral encouragement; social planning; other methods.

Organizational and legal or administrative methods of management of economic security company based on grounds of coercion and include the construction and improvement of the management structure, definition of responsibilities of employees, development and application of administrative orders, instructions and other documents that facilitate interaction between subject and object control point.



## REFERENCES

1. Zubok, M. I. (2003) *Banking safety: a manual for independent study of discipline*. Kiev: KNEU [in Ukrainian].
2. Moiseienko, I.P., Demchyshyn, M.I. (2011) Methodological bases for measuring the level of economic security of the state. *Aktualni problemy ekonomiky*, №10(124), 90–98 [in Ukrainian].
3. Baldwin, D. A. (2014). The Concept of Security. *Review of International Studies*, 23 (1), 5-26.
4. Vasylytsiv, T. H. (2008). *Economic security of Ukraine's entrepreneurship: a strategy and strengthening mechanism*. Lviv: Aral [in Ukrainian].
5. Dovbnia, S. B. Hichova, N.Iu. (2008). Diagnostics of the level of economic security of the enterprise. *Finansy Ukrainy*, 4, 88-97 [in Ukrainian].
6. Graham, B. Dodd, D. (2009). Security Analysis. The Classic 1934. New York: *The McGraw-Hill Companies, Inc.*
7. Illiashenko, S. M. (2009). *Economic risk: tutorial*. Kiev: Tsentr navchalnoi literatury [in Ukrainian].
8. Kleiner, H.B., & Kachalov, P.M. (1997). *Enterprise in an unstable economic environment: risks, strategies, security*. Moskva [in Russian].
9. Iakubovych, Z. (2010). Formation of the economic security system of the machine-building enterprise. *Visnyk TNEU*, № 1 81-86 [in Ukrainian].
10. Neu, C. Richard., Jr, Charles Wolf. (1994). The Economic Dimensions of National Security, RAND. 86.
11. Chubai, V.M. (2011). Factor model for assessing the competitiveness of machine-building enterprises. *Aktualni problemy ekonomiky*, № 6 (96), 156-163 [in Ukrainian].
12. Reznikov, O.L. (2011). *Formation of economic security of an industrial enterprise*. Extended abstract of candidate's thesis. Mariyopol: ONTU [in Ukrainian].
13. Matviichuk, L.O. (2011). *Formation and optimization of the structure of capital in the system of financial security of the enterprise*. Extended abstract of candidate's thesis. Khmelnytskyi: ONTU [in Ukrainian].
14. Bublyk, M., Koval, V. & Redkva, O. (2017) Analysis impact of the structural competition preconditions for ensuring economic security of the machine building complex. *Marketing and Management of Innovations*, 4, 229-240. doi: 10.21272/mmi.2017.4-20.
15. Nevzorov, V. B. (2000). *Mathematical theory*. Moskva: FAZIS [in Russian].
16. Vivchar O. I. (2018). *Management of economic safety of enterprises: socio-humanitarian contexts*. Ternopil: FOP Palianytsia V. A. [in Ukraine].

## ЛІТЕРАТУРА

1. Зубок М. І. Безпека банківської діяльності: навчально-методичний посібник для самостійного вивчення дисципліни. Київ: КНЕУ, 2003. 154 с.
2. Мойсеєнко І.П., Демчишин М.Я. Методологічні основи вимірювання рівня економічної безпеки держави. *Актуальні проблеми економіки*. Київ, 2011. №10(124). С. 90-98.
3. Baldwin D. A. The Concept of Security. *Review of International Studies*. 1997. № 23. 5-26.
4. Васильців Т. Г. Економічна безпека підприємництва України: стратегія та механізм зміцнення. Львів: Арал, 2008. 384с.
5. Довбня С.Б., Гічова Н.Ю. Діагностика рівня економічної безпеки підприємства. *Фінанси України*. 2008. №4. С. 88-97.
6. Graham B. *Security Analysis*. The Classic 1934 NY: The McGraw-Hill Companies, Inc. 2009. 736 p.
7. Ілляшенко С. М. Економічний ризик: навчальний посібник. Київ: Центр навчальної літератури, 2009. 220 с.
8. Клейнер Г.Б., Тамбовцев В.І., Качалов Р.М. Предприятие в нестабильной экономической среде: риски, стратегии, безопасность. Москва, 1997. 288с.
9. Якубович З. Формування системи економічної безпеки машинобудівного підприємства. *Вісник ТНЕУ*. 2010. № 1. С. 81-86.
10. Neu C. R. The Economic Dimensions of National Security. 1994. RAND, 86.
11. Чубай В.М. Факторна модель оцінювання конкурентоспроможності машинобудівних підприємств. *Актуальні проблеми економіки*. 2009. № 6 (96). С. 156-163.
12. Резніков О.Л. Формування економічної безпеки промислового підприємства: автореф. дис. ... канд.екон.наук: спец.08.00.04. Маріуполь, 2011. 20 с.
13. Матвійчук Л.О. Формування та оптимізація структури капіталу в системі фінансової безпеки підприємства: автореф. дис. ... канд.екон.наук: спец.08.00.04. Хмельницький, 2011. 20 с.
14. Bublyk, M., Koval, V. & Redkva, O. Analysis impact of the structural competition preconditions for ensuring economic security of the machine building complex. *Marketing and Management of Innovations*. 2017. vol. 4. pp. 229-240. doi: 10.21272/mmi.2017.4-20.
15. Невзоров В. Б. Математическая теория. Москва: ФАЗИС, 2000. 914 с.
16. Вівчар О. І. Управління економічною безпекою підприємств: соціогуманітарні контексти. Тернопіль: ФОП Паляниця В. А., 2018. 474 с.