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Preface

This book presents the results of Polish-Ukrainian scientific cooperation. It contains the papers prepared for the 10th international conference “Quantitative Methods in Accounting and Finance”. Accounting and finance face nowadays many challenges. They require both an international and local approach, they need to be considered from the theoretical and practical point of view, and they also encourage general and specific analysis.

Support from quantitative methods is needed in order to discover, implement and verify new finance and accounting trends, methods and instruments. The research papers which are part of this book present different aspects of accounting and finance combined with a quantitative, in particular Econometric, approach.

Some of the papers focus on methodology of measurement, estimation and forecasting of financial phenomena, especially those related to investment processes. Others address specific problems of accounting such as accounting solutions for different branches, legal issues of accounting, responsibility and reporting. An alternative approach was also undertaken and the roles of a narrative and culture in accounting were presented.

The variety of papers selected for this issue ensures the complexity of the book. It provides theoretical as well as empirical material which can be used in further research and in business practice, particularly in accounting and finance. We hope that the content of the book provides a starting point for scientific discussion and practical changes.

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**IMPLEMENTATION OF THE RESULTS
PHASE OF THE ESTIMATION SYSTEM
OF THE ECONOMIC SECURITY OF ENTERPRISES**

**WDROŻENIE WNIOSKÓW
Z SYSTEMU OCENY BEZPIECZEŃSTWA
EKONOMICZNEGO PRZEDSIĘBIORSTW**

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Summary: This article explains the concept of realization in the practical activity of one of the stages of estimation of the economic security of enterprises. The modern need of Ukrainian business entities in establishing an effective system of economic security underscores the relevance of the problem. The development and implementation of the staged estimation mechanism of economic security into the enterprise management system is the purpose of the research. The marked stage of estimation is suggested to realize in practical activity of a productive industrial enterprise that is selected research object. The investigated «Stage of results» is successive and interrelated with other offered stages of mechanism of estimation of the system of economic security of enterprises that is built on the basis of reasonable directions of this estimation. «Results phase» involves the estimation of the results and analysis of the factors that influenced the result of this evaluation. The priority direction of estimation is the research of factors that influenced the existent level of competitiveness of the investigated enterprise. The offered quantitative methods of estimation take into account not only the result and efficiency of the functioning of the constituents of economic security of the enterprise but also the degree of their defence.

Keywords: economic security, stages of estimation of economic security, constituents of economic security, quantitative methods of estimation, analysis of factors that influenced on the result of estimation of economic security.

Streszczenie: Artykuł wyjaśnia koncepcję wdrożenia jednego z etapów oceny bezpieczeństwa ekonomicznego przedsiębiorstwa. Wdrażanie efektywnego systemu oceny bezpieczeństwa ekonomicznego przedsiębiorstwa jest aktualną problematyką na Ukrainie. Cele tego systemu warunkują opracowanie i wdrożenie mechanizmu oceny bezpieczeństwa ekonomicznego przedsiębiorstwa. W artykule przedstawiono jeden z etapów oceny bezpieczeństwa ekonomicznego wybranego przedsiębiorstwa przemysłowego. Etap będący przedmiotem badań jest spójnie połączony z innymi zaproponowanymi etapami mechanizmu oceny systemów bezpieczeństwa ekonomicznego przedsiębiorstwa. Przedstawiony etap dotyczy oceny

uzyskanych wyników i analizy czynników, które miały wpływ na wynik tej oceny. Priorytetowym przedmiotem oceny jest badanie czynników wpływających na istniejący poziom bezpieczeństwa ekonomicznego badanego przedsiębiorstwa.

Słowa kluczowe: bezpieczeństwo ekonomiczne, etapy oceny bezpieczeństwa ekonomicznego, składowe oceny ekonomicznej, ilościowe metody oceny.

1. Introduction

The problem of the effective estimation in the modern activity of business subjects in general and systems of economic security, in particular, in today's Ukraine occupies a special place among other current research of economic science. Nowadays there is not a generally accepted method and successive mechanism of estimation of the system of economic security, and its constituents. The absence of a unique approach regarding the estimation of the system of economic security makes impossible the effective realization of this system in the practical activity of Ukrainian business structures, and on this basis, slows their modern development. Today's domestic enterprises need totally new mechanisms and methods of estimation that answer the modern realities of their functioning and global achievements in the system of economic security.

The problem of effective methods of estimation in general and the systems of economic security, in particular, are not new and have been investigated by many well-known practitioners and scientists such as: I.M. Luckiy, Z.O. Maniv, I.I. Nagorna, D.P. Pilova, O.L. Reznikov, A.M. Tkachenko, S.M. Shkarlet and others [Maniv 2006; Nagorna 2004; Pilova 2007; Tkachenko 2010; Shkarlet 2007]. However, without regarding the ponderable existing scientific research there is a number of open questions, in particular in regard to forming the successive stage-by-stage mechanism of the estimation of constituents of economic security, its practical realization in domestic area, and the recognition of descriptions of factors of its constituents.

The modern requirement of the Ukrainian business subjects in the introduction of an effective system of economic security underlines the actuality of the problem. The development and introduction of a stage-by-stage mechanism of the estimation of economic security into a system of the management of an enterprise stipulates the research purpose.

2. Stages and directions of estimation of the economic security of enterprises

The introduction and effective realization of a system of economic security into the practical activity of domestic enterprises foresees the development of an effective mechanism of its estimation. In previous research, it is suggested by us that the approaches existing in Ukrainian realities in relation to the method of estimation

of economic security of enterprise are mainly based on the determination of the essence of the concept «economic security of enterprise». The approaches offered by research workers are in our opinion imperfect, have advantages and failings, and do not give a clear understanding of the economic strength which exists within an enterprise security.

The procedure of the estimation of the economic security of enterprises is a difficult and laborious process, as it includes in itself not only the granted description efficiency of the economic activity of the managing subject but also a degree of defense of this activity, and others. An important moment in forming the mechanism of estimation of economic security is the clear differentiating on the certain stages and the establishment of the directions of this estimation.

On the basis of the essence of economic security provided by us, the next directions and stages of its estimation are offered. In our opinion, the process of estimation must be divided into five stages: planning; preparation; realization; results; reacting.

These stages answer the following directions of estimation generalized by us: estimation and concordance of purpose of activity of the enterprise with the aims of control system and economic security; estimation of competitiveness of the enterprise, both as a whole and of its constituents; estimation of factors which influenced the existing level of competitiveness; estimation of the system of measures which is aimed at providing a high level of this competitiveness.

It is necessary to highlight that all the offered stages fully answer the directions of estimation, they are interconnected and complement each other.

3. Basis of the stage of results

In the next part of research we offer the basis for the stage of results of the system of the estimation of the economic security of enterprises. This stage provides the estimation of the achieved results and an analysis of the factors which influenced this result.

This is an important stage in the system of the functioning of the economic security of an enterprise, which not only characterizes the system but also gives recommendations in relation to its perfecting. We suggest realizing the «Stage of results» after certain steps. This will allow to specify the measures and tasks conditioning this stage and to set the ways of their deciding. Also, it is necessary to point out that the «Stage of results» must take into account and harmoniously complement the previous and next stages.

The separate estimation of the constituents is foreseen in the mechanism of the estimation of the economic security of the enterprise developed by us, with the subsequent integration of their indexes into the eventual, general value. Thus, the estimation can be distributed in two ways: realization of the functional estimation of the level of constituents of the economic security of the enterprise; realization of the functional estimation of the economic security of the enterprise as a whole.

Accordingly, the «Stage of results» must follow the adopted plan and chart of type of estimation, period of its evaluation, etc. (Table 1).

Table 1. Plan of evaluation of the system of economic security of an enterprise

	Description
Purpose of estimation	Determination of level of competitive edges of enterprise, establishment of factors of influence on their forming and development of measures of reacting to detected threats in relation to their functioning.
Task of estimation	<ul style="list-style-type: none"> • Exposure of possibilities and level of operationability, quality and efficiency of the use of information, degree of its defence. • Analysis of observance of norms of current legislation, account and prediction of negative consequences in activity of enterprise in relation with his changes. • Determination of level of competitive edges of all types of resources of enterprise, exposure of possibilities in relation to efficiency of their use and development of measures of reacting to detected threats in relation to their functioning. • Determination of level of positions of enterprise is at the market, exposure and co-ordination of its possibilities. • Determination of level of protection of potential of the enterprise, its economic connections with contractors.
Direction of estimation	Concordance of purpose of activity of the enterprise with the tasks of control system and economic security in particular.
Type of estimation	Separate estimation of constituents, with subsequent integration of their indexes to the eventual, general value.
Kind of estimation	<ul style="list-style-type: none"> • Realization of functional estimation of level of constituents of economic security of enterprise. • Realization of functional estimation of level of economic security of enterprise as a whole.
Periodicity of estimation	In according to developed chart of estimation after periods which will take into account the particular branch, production and other features of a separate concrete enterprise.

Source: author's elaboration.

Analyzing the results of any types of verification, a manager must take into account the criteria and methods of estimation. It is necessary to stress that in accordance with the kind and term of evaluation, the used methods and criteria can change. Thus, certain constituents can be estimated not only monthly, but quarterly or yearly – others, for example are more difficult, but more effective. In previous research we offered the criteria and methods of estimation of economic security of enterprise on the whole and its constituents in particular (Table 2).

On the basis of the obtained results on the “Stage of results” it is necessary to set economic security level as a whole, or its constituents. In the studied industry, the conducted research shows that most discussions among researchers were caused by questions, regarding the level of exactness of the indicators of economic security. In modern scientific domestic area nowadays the generally accepted methodical base

Table 2. Criteria and methods of estimation of the system of economic security of an enterprise

Object of estimation	Criteria of estimation	Method of estimation
General estimation of economic security level	Integration of indexes of level of constituents of economic security to the eventual, general value	Quantitative methods of estimation (usage of graphic scale of estimations), calculation of mean value
Informative constituent	<ul style="list-style-type: none"> – confidentiality – integrity – availability – appeal – accountability – authenticity – truthfulness 	Quantitative methods of estimation (usage of graphic scale of estimations)
Politically legal constituent	<ul style="list-style-type: none"> – legal protection of interests of enterprise into contractual and other business document – observance of legal rights for an enterprise and its workers – losses from observance failure of requirements of current legislatio – losses from the change of legislation 	As a result of internal and external verification: <ul style="list-style-type: none"> – conclusion of public fiscals verification – quantitative methods of estimation (usage of graphic scale of estimations)
Resource constituent	<div style="display: flex;"> <div style="writing-mode: vertical-rl; transform: rotate(180deg); font-size: small; padding-right: 5px;">Depending on the object of estimation</div> <div> <p>Intellectual potential of enterprise; level of competitive edges of personnel (personal and professional qualities, level of qualification, education)</p> <p>decline of liquidity; increase of creditor and debtor debt; decline of financial firmness; actions, directed on injury of technological potential of enterprise</p> </div> </div>	<p>Depending on the classification of personnel: aims management, method of committees, qualification estimation, ball estimation, graphic scale of estimation, ranging, estimation 360 degrees, diary, method of normative estimation, attestation, estimation of practical activity, functional analysis of work</p> <p>Statistical methods of estimation; methods of economic and financial analysis; model SIA; economic mathematical methods; graphic scale of estimations; analysis of factors and indexes of forming of capital</p>
Market	<ul style="list-style-type: none"> – diminishing of market share which belongs to the enterprise – weakening of competition positions and ability to counteract against competition pressure – a decline of adaptation possibilities of enterprise to the changes at the market, – lag from the requirements of market 	A matrix method of estimation (System of indexes of indicators of market attractiveness), method of SWOT – analysis; quantitative methods of estimation (usage of graphic scale of estimations)
Interface	Reliability of economic contractors of enterprise; Implementation of contracts; Losses from unforeseeable changes	Quantitative methods of estimation (usage of graphic scale of estimations); Expert method on the basis of metod of Illyashenko S.M. with its certain changes

Source: author's elaboration.

regarding the determination of economic security of the enterprise would take into account the features of activity of the enterprise, its a particular branch of activity, model of ownership, capital structure, and the lack of existing organizational technical level. As a result, the insufficient determination of indicators of economic security can result in the misinterpretation of information and values of separate indexes. Such an error can result in inadequate administrative decisions in economic security.

In our opinion, at this stage it is important to take into account the methods of estimation and exactness of the achieved results. Thus, in the offered mechanism of economic security, the realization of the generalized estimation is foreseen with quantitative methods which simplifies in same order as a system of calculation of indexes for the exactness and working out in detail of the received results. Accordingly, there is no requirement for a too detailed and multilevel description of the economic security levels. In the domestic scientific field, on the basis of the analysis of the existing levels of the economic security of an enterprise and the system of its estimation developed by us, five levels are proposed: absent; low; medium; high; very high. The next values of indexes answer to these levels (Table 3).

Table 3. Description of the levels of economic security of enterprises

Range of estimation (After the choice of enterprise)		Level of economic security of enterprise	Condition of enterprise
Ball estimation (from 1 to 10)	Percent estimation (from 0 to 100%)		
Less than 2	Less than 20%	«Absent»	An enterprise is unprofitable. System of measures, which must react on the internal and external threats, is absent
2-4	20-49%	«Low»	An enterprise is not competitive, has a certain level of income. The system of measures which must react to internal and external threats does not work effectively
5-7	50-79%	«Medium»	An enterprise has medium level of competitiveness, which is provided with the system of measures, which reacts to detected internal and external threats
8-9	80-90%	«High»	An enterprise in a region in certain industry has a high level of competitiveness which is provided with the effective system of complex measures, that quickly reacts to detected internal and external threats
10	More than 90%	«Very high»	In a certain industry and country (region) an enterprise has one of the greatest levels of competitiveness which is provided with the effective system of complex measures, that in good time reacts to detected internal and external threats

Source: the author's elaboration.

According to Table 3, every enterprise can independently select the range of estimation, depending on the necessities and features.

As the example of the process of forming of conclusions we selected the enterprise «Aleks», that is involved in the production of bottled mineral waters and other soft drinks. An enterprise has the seasonal type of production, as a consumption of water in warm weather is increased and it decreases in winter. The basic difference in this industry is the defense and efficiency of functioning of the resource constituent during the increase of volume of the operating activity. Also important for this type of production is the co-ordination of internal possibilities with a market environment which is the economic security of the market constituent. According such conditions, the estimation of these constituents will be carried out more frequently than the others. Accordingly, the estimation of the level of interface and politically legal constituents will be carried out less frequently. Thus, normatively legal adjustment of this branch of production in our country has not changed in the last few years. The enterprise does not carry out foreign economic activity. On the basis of the criteria of estimation, the enterprise should to draw conclusions in relation to the estimation of economic security (Table 4).

Table 4. Forming of conclusions regarding the estimation of the system of the economic security of an enterprise «Aleks»

Object of estimation Range of estimation	Result of estimation of constituents of economic security %					General estimation of the system of economic security %
	Informative constituent	Politically-legal constituent	Resource constituent	Market constituent	Interface constituent	
Range (0-100%)	50	81	40	48	62	56
Level	Middle	High	Low	Low	Middle	Middle

Source: the author's elaboration.

According to Table 4, in this example the studied enterprise on the whole has a medium economic security level valued at 56%. This confirms the medium level of competitiveness of the analysed enterprise, which is provided with the system of measures which reacts to the detected internal and external threats. The general level of the system of economic security forms the level of defence and efficiency of functioning of its constituents. Thus, the value of index of informative constituent at 50% confirms the medium level of defense and efficiency of forming and the use of information. In this enterprise there are problems with accountability of information and communication links. The value of index of politically-legal constituent at 81% confirms the high level of legal protection of interests of the enterprise in contractual and other business documentation. Effective legal service which provides the observance of legal rights for an enterprise and its workers works in the analysed

enterprise. There are minimum losses from the failure of the requirements of the current legislation in the enterprise. The result of index of resource constituent at 40% testifies to the low level of defense and efficiency of the use of resources of the enterprise. In the enterprise there are low levels of competitive edge of personnel which has an insufficient level of qualifications and education. The analysis of basic indexes of the enterprise showed a decline in its liquidity, increase of creditor and debtor debt, decline of financial firmness. The value of index of market constituent at 48% testifies to the low level of position of the studied enterprise in the market. This index confirms the diminishing market share of the enterprise, and also weakening of the competitive position and the ability to counteract competitive pressure. The low level of this constituent also can confirm the decline of adaptive possibilities of the enterprise to the changes in the market. The value of interface constituent at 62% testifies to the medium level of reliability of economic contractors of enterprise. It is possible to establish the implementation of contracts of the studied enterprise not as a complete measure and in the presence of problem contracts in particular. It is possible to see that for analysed period the enterprise has certain losses from unforeseeable changes in calculations with contractors. While forming of conclusions it is important to analyse the existing factors which influenced the obtained result. The clear basis of the factors will allow the next stage of the system for the estimations of economic security to develop the «Stage of reacting» measures of reacting.

In previous research we suggested the following classification of factors which influence the economic security level: external (at an international level, at the level of the state); internal (at the level of enterprise, at the level of personality).

We offer the system of estimating the influence of factors on economic security, which is built on quantitative methods which are simple and accessible for use. In our opinion, the use of the given methods will allow not only to estimate the state of the studied factors but also to define the influence of each of them.

The offered system of estimations of factors, which influence economic security level, consists of six component parts: realization of ranging and establishment of rating of factors; establishment of coefficients and description of the ball scale regarding the estimation of the probed factors; realization of the ball estimation on every separate factor in the dynamics of years; a calculation of influence of formative factors of economic security in the dynamics of years; analysis and estimation of the detected results of the estimation; establishment interconnection between the factors.

On the basis of rating we calculated factor hierarchy and co-operation of the factors which influenced the level of constituents of the economic security which allows to expect the index of factors:

$$F = F_1 \times x_1 + F_2 \times x_2 + F_3 \times x_3 + F_4 \times x_4 + F_5 \times x_5 \quad (1)$$

– index of factors of forming economic security;

F_1, F_2, F_3, F_4, F_5 – (0-1) coefficients which characterize influence of every factor on forming of economic security;

x_1, x_2, x_3, x_4, x_5 – (1-5) ball estimation of factors.

It is necessary to point out that the index of factors must be calculated for every separate type of factors: external (an international level(F_{ei}), the level of the state (F_{es})); internal (the level of enterprise (F_{ie}), the level of personality (F_{ip})).

Also on the basis of information we can calculate the noted index for all analyzed years and its average index:

$$F_a = \frac{F^1 + F^2 + \dots + F^n}{T}, \quad (2)$$

F_a – average index of factors which have an influence on the process of forming of economic security of enterprises;

$F^1 \dots F^n$ – quantity of certain factors;

T – amount of the studied years.

According to Table 5 the most positively on the whole these factors influenced political-legal constituent and interface constituent of the economic security level. Most negatively the factors influenced the forming of resource constituent of the economic security of enterprises. It is necessary to stress that internal factors influenced more exactly which confirms the ineffective control system and economic security of enterprise in particular.

The research of indexes of factors will allow to define the real negative and positive factors which influenced the economic security level as a whole, and its constituents in particular. Comparing the index of external factors to the internal will allow to define their intercommunication and force of the influence of each of them. Thus, if the index of external equals the index of internal ($F_{ei} = F_{es} = F_{ie} = F_{ip}$), it is possible

Table 5. Calculation of indexes of factors which influenced economic security level of the enterprise «Aleks»

Classification of factors	Factors (F)	Constituents					
		Informative	Politically-legal	Resource	Market	Interface	
1	2	3	4	5	6	7	
External	International level	F^1	0.6	0.6	0.6	0.6	0.6
		F^2	0.5	0.75	0.25	0.5	0.75
		F^3	0.2	0.6	0.2	0.4	0.6
		F_{ei}	1.3	1.95	1.05	1.5	1.95
	State level	F^1	0.6	0.6	0.6	0.6	0.6
		F^2	0.5	0.75	0.25	0.5	0.75
		F^3	0.2	0.6	0.2	0.4	0.6
		F^4	0.45	0.6	0.3	0.45	0.6
		F^5	0.3	0.3	0.2	0.3	0.3
		F_{es}	2.05	2.85	1.55	2.25	2.85

Table 5, cont.

1	2	3	4	5	6	7	
Internal	Enterprise level	F^1	0.9	0.9	0.9	0.9	0.9
		F^2	0.5	0.75	0.25	0.5	0.75
		F^3	0.4	0.6	0.4	0.4	0.6
		F^4	0.45	0.45	0.3	0.45	0.45
		F^5	0.3	0.3	0.3	0.3	0.4
	F_{es}	2.55	3.0	2.15	2.55	3.0	
	Personal level	F^1	1.2	1.2	1.2	1.2	1.2
		F^2	0.5	0.75	0.25	0.5	0.75
		F^3	0.4	0.8	0.4	0.6	0.8
		F_{ip}	2.1	2.75	1.85	2.3	2.75
$T = 1$	F_s	8	10.55	6.6	8.6	10.55	

Source: author's elaboration.

to establish equivalent influence of the studied factors, and also the adequacy of the control system enterprise. The effective realization of the «Stage of results» will allow the next stage of reacting to develop the number of measures to increase the efficiency of the system of economic security.

4. Conclusions

The basis for the stage of results of the system of estimation of economic security of enterprises allows to make following conclusions. The «stage of results» is one of the stages of stage-by-stage mechanism of the system of estimation of economic security of enterprises. This stage is foreseen by the analysis of the received results and the research of factors which influenced this result. The results of the estimation of economic security of enterprises must fit the set plan and chart, the type of estimation, period of its making, methods and criteria of realization, etc.. In the system of estimation we propose five economic security levels: absent; low; medium; high; very high. It is necessary to point out that an enterprise can independently select the range of estimation, depending on the organizational, technological and production features. At the stage of results it is important to include the basis of factors which influenced the obtained result.

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