Економічні горизонти

Homepage: http://eh.udpu.edu.ua

ISSN 2522-9273 (print)
ISSN 2616-5236 (online)

Economies' Horizons, No. 1(8), pp. 14–24.

DOI: https://doi.org/10.31499/2616-5236.1(8).2019.161733

UDC 658.5:33-049.5

Use of speed indicators in assessing and ensuring economic security of enterprises

Volodymyr Ya. Nusinov[1], Doc. Ec. Sc., Professor
Ievgeniia V. Mishchuk[2], Cand. Ec. Sc., Associate Professor

Received: *11 February 2019*
Accepted: *14 March 2019*

Nusinov, V. Ya. and Mishchuk, Ie. V. (2019), "Use of speed indicators in assessing and ensuring economic security of enterprises", *Economies' Horizons,* no. 1(8), pp. 14–24, doi: https://doi.org/10.31499/2616-5236.1(8).2019.161733.

Abstract. *The purpose of the research.* The article is aimed at systematizing of existing speed indicators used in economics when assessing and ensuring economic security of an enterprise. *Methodology.* The study applied general scientific theoretical methods: generalization, explanation, grouping – to analyze the views of economists on the object of study and formulate conclusions of the content analysis of primary sources, analysis and synthesis – to clarify the main scientific categories of research, justification of new conceptual provisions, principles, concepts and categories; schematic and graphical image – for visual presentation of the results. *Results.* The article analyzes speed indicators existing in economic literature. Most of the indicators are determined to be applied to analyzing business activities of an enterprise, and the average absolute increment is the generalized speed of change of a phenomenon in time. The work generalizes and characterizes speed kinds existing in the theory of statistics as well as suggesting the methodological framework for assessing the economic security based on the enterprise hierarchical structure. Time and money are determined to be the most important resources for ensuring economic security. A problem is discovered which consists in the necessity of combining heterogeneous indicators in a single economic security assessment indicator and creating an accumulation of specific indicators practical use of which is complicated. The suggested solution of the problem consists in application of time as an indicator accumulating various factors' effects when assessing economic security. To determine time necessary for achieving the required value by indicators of economic security components of the first hierarchal level, trend equations or other forecasting methods can be used. The time required to achieve the appropriate level of economic security components of the second hierarchal level is proposed to be determined in two ways: by the maximum or the sum of periods found on the components of the first level of the hierarchy. To assess the time for achieving the adequate level of economic security by the kinds located at the highest hierarchal levels, two directions are suggested. The first direction provides for forecasting and construction of a new function, the second one envisages determination of the maximum period or their amount in terms of time found for the components of the second level of the hierarchical structure of economic security. *Practical meaning.* The article justifies ways of

[1] *Kryvyi Rih National University; Professor at the Department of Accounting, Taxation, Public Management and Administration; ORCID ID: https://orcid.org/0000-0002-9293-2969; e-mail: vladimir.ya15@gmail.com.*
[2] *Kryvyi Rih National University; Associate Professor at the Department of Accounting, Taxation, Public Management and Administration; ORCID ID: https://orcid.org/0000-0003-4145-3711; e-mail: tdutybz.077@gmail.com.*

using the values of speeds and, if there are acceleration available, corresponding changes of indicators which, in their turn, impact achievement and maintenance of the appropriate level of economic security of an enterprise. The expediency of determining the speed as a derivative of the economic security indicator value, and acceleration as a derivative of the speed or the second derivative of the economic security indicator value, is proved. Attention is focused on the feasibility of considering the current cycle stage in the economy and the life cycle stage of the enterprise itself. It is proposed to normalize time indicators and, in accordance with the standard time, determine new normative values of economic security indicators, normative indicators of speed and acceleration as well as introducing the concepts of "economic speed" and "economic acceleration" into the scientific terminology. The *further researches* of the authors will be devoted to this. Another direction of further development will be the identification of their specific *features in the future*.

Keywords: economic security, indicator, standard, acceleration, trend, time, speed.

JEL Classification: C61, H56, J28

Number of references: 1**9**; *number of tables*: **2**; *number of figures*: **1**; *number of formulas*: **8**.

Застосування показників швидкості при оцінюванні та забезпеченні економічної безпеки підприємства

Нусінов В. Я.[1], д. е. н., професор
Міщук Є. В.[2], к. е. н., доцент

Стаття надійшла: *11.02.2019*
Стаття прийнята: *14.03.2019*

Nusinov V. Ya., Mishchuk Ie. V. Use of speed indicators in assessing and ensuring economic security of enterprises. *Економічні горизонти.* 2019. № 1(8). С. 14–24. DOI: 10.31499/2616-5236.1(8).2019.161733.

Анотація. *Мета дослідження*. Метою статті є систематизація існуючих показників швидкості, що використовуються в економіці при оцінці та забезпеченні економічної безпеки підприємства. *Методологія*. У дослідженні застосовуються загальнонаукові теоретичні методи: узагальнення, пояснення, групування – для аналізу поглядів економістів на об'єкт дослідження та формулювання висновків контент-аналізу первинних джерел, аналіз і синтез - для з'ясування основних наукових категорій дослідження, обґрунтування нових концептуальних положень, принципів, концепцій та категорій; схематичне і графічне зображення – для візуального представлення результатів. *Результати*. Проаналізовані існуючі в економічній літературі показники швидкості. Виявлено, що більшість з них застосовується при аналізі ділової активності підприємства. Встановлено, що узагальнюючим показником швидкості зміни явища у часі є середній абсолютний приріст. Узагальнено та охарактеризовано існуючі в теорії статистики види швидкості. Запропоновано методичні засади оцінювання економічної безпеки підприємства, що ґрунтуються на її ієрархічній побудові. Встановлено, що найважливішими ресурсами забезпечення економічної безпеки є гроші та час. Виявлено проблему, яка полягає у необхідності поєднання в одному показнику оцінки економічної безпеки різнорідних індикаторів та створенні нагромадження специфічних показників, важко застосовуваних на практиці. Запропоновано для її вирішення при оцінюванні економічної безпеки використовувати час в якості показника, який

[1] *Криворізький національний університет; професор кафедри обліку, оподаткування, публічного управління та адміністрування; ідентифікатор ORCID: https://orcid.org/0000-0002-9293-2969; e-mail: vladimir.ya15@gmail.com.*

[2] *Криворізький національний університет; доцент кафедри обліку, оподаткування, публічного управління та адміністрування; ідентифікатор ORCID: https://orcid.org/0000-0003-4145-3711; e-mail: tdutybz.077@gmail.com.*

акумулює дію різних чинників. Показано, що для визначення часу, необхідного на досягнення необхідного значення індикаторами складових економічної безпеки, які знаходяться на першому рівні ієрархії можуть використовуватись рівняння тренду або інші методи прогнозування. Запропоновано час, необхідний для досягнення належного рівня складових економічної безпеки, які знаходяться на другому рівні ієрархії, визначати двома шляхами: максимумом або сумою періодів, знайдених за складовими, розташованими на першому рівні ієрархії. Для оцінювання часу досягнення належного рівня економічної безпеки за тими видами, що розташовані на вищих рівнях ієрархії запропоновано два напрями. При цьому за першим напрямом передбачається прогнозування і побудова нової функції, а за другим – визначення максимального періоду чи їх суми по показникам часу, знайденим для складових другого рівня ієрархічної структури економічної безпеки. *Практичне значення*. Обґрунтовано шляхи використання значення швидкостей та, за наявності, прискорення, відповідних змін щодо показників, які, своєю чергою, впливають на досягнення та забезпечення належного рівня економічної безпеки підприємства. Доведено доцільність визначення швидкості як похідної від значення індикатора економічної безпеки, а прискорення як похідної від швидкості або другої похідної від значення індикатора економічної безпеки. Акцентовано увагу на доцільності врахування етапу поточного циклу в економіці та стадії життєвого циклу самого підприємства. Запропоновано нормувати показники часу і відповідно до нормативного часу визначати нові нормативні значення індикаторів економічної безпеки, нормативні показники швидкості та прискорення. Запропоновано у науковий термінологічний обіг ввести поняття «економічна швидкість» та «економічне прискорення». Цьому будуть присвячені *подальші дослідження авторів.* Іншим напрямом *наступних розробок стане* розкриття їх специфічних особливостей.

Ключові слова: економічна безпека, індикатор, норматив, прискорення, тренд, час, швидкість.

Кількість джерел: **19**; *кількість таблиць:* **2**; *кількість рисунків:* **1**; *кількість формул:* **8**.

1. Introduction.

The statement that every business has its own dynamics characterized by different speed of changes is considered axiomatic (*Vihanskij and Naumov, 2003, p. 326*). It is quite obvious that the enterprise whose response to changes of both internal and external environments is the fastest will be more competitive and possess higher economic security as compared with other ones. B. Gates called speed the key concept of the first decade of the 2000s, pointing out that quality was key in the 1980s, whereas business reengineering – in 1990s. He emphasized importance of business change speed and rapid business management in connection with the dynamics customer life and their needs change and foresaw that the speed of product quality growth and the speed of business process enhancement would be much higher, and great values of these indicators would result in the changes of the character of business itself (*Gates, 2001, p. 12*).

One of the main problems causing decrease of the enterprise economic security level is high dynamics of its economic activity conditions. Nowadays, enterprises function in conditions of high speeds of external environment changes and chronic shortage of time. The shortage results from a range or reasons, among which are discrepancies between the speed of economic conditions and, as a result, the state of an enterprise and the ability to fix the state, as well as between the speed of the state of an enterprise and the ability to respond to this change. Enterprises do not often have enough time to diagnose and process signals of their economic security change, make or cancel certain managerial decisions, respond the signal by activities and implement necessary measures.

At present, the indicator approach to assessing the economic security level is known to prevail in modern science of security. It is based on comparing threshold (standard)

values with current ones. However, according to A. Hrinenko (2018), the offered threshold levels are static and assess the achieved levels but not the trends whereas in quickly changing societies it is dynamics of political, economic and social processes that is more informative in terms of security assessment, at that, the considered logic with subtle modifications underlies most popular constructions of economic security thresholds (*Hrinenko, 2018, p. 74*). At the same time, the speed of capital turnover impacts the annual turnover of an enterprise and, consequently, corresponding economic indicators of its activities, as well as influencing considerably the economic security level in general. The enterprise with the comparatively small amount but faster use of finance can have the same turnover and the same economic security level as the one with the great amount of finance but the slower speed of its turnover. For instance, the absolute liquidity ratio level itself is not a sign of bad or good solvency; when determining its level, the speed of current assets turnover and the speed of short-term liabilities turnover should be taken into consideration (*Savickaja, 2000, p. 642*).

Despite the quite frequent application of current assets turnover speed indicators in the economic security assessment practice, peculiarities of determining speed indicators themselves and their kinds are not sufficiently covered in scientific literature.

2. Literature review.

In our opinion, the indicator of money turnover speed which is a key factor of the money quantity change, is the most known speed indicator in economics. The most often used indicators to assess it are an indicator of the money movement in the turnover of the gross product cost or the national income that characterizes connection of money turnover with economic development processes; money turnover in payment operations indicating the speed of non-cash payments (*Poljak, 2001, p. 37–38*).

Specification of speed indicators is the most popular when assessing enterprise business activities. L. V. Dontsova and L. V. Nikiforova (2000) state that business activity in its financial aspect is revealed, first of all, in the assets turnover speed (*Dontsova and Nikiforova, 2000, p. 90*). A. D. Sheremet and Ye. V. Negashev (1999) define the assets turnover speed as a complex indicator of the organizational and technical level of production and economic activities, the number of cycles is achieved at the expense of the reduced production time (*Sheremet and Negashev, 1999, p. 124–125*). For instance, speeds of accounts receivable and payable turnovers for the period under analysis characterize the ratios of turnover of accounts receivable and payable respectively, the speed of goods and materials reserve sales of the enterprise characterizes the ratio of the material reserves to sales (*Petrenko, 2010, p. 102*). According to L. M. Petrenko, (2010) the turnover speed increase reflects increase of the economic potential of the enterprise as it enables freeing up part of the current assets for the enterprise's own needs (production development in particular) (*Petrenko, 2010, p. 104*).

M. Yu. Medvedev's remark should be mentioned that the turnover indicator characterizing the turnover speed and the turnover time derived from it belong completely to a static object, but analogues may be invented for a dynamic object, e.g. the dynamic object change speed, and the time of one turnover determined not through average values but directly through relation to a particular dynamic object (*Medvedev, 2001, p. 277*).

Along with that, the specialist literature presents other speed indicators. For instance, in the Soviet economy one of the first speed indicators was speeds of change of the marginal substitution rate which was quantitatively estimated using the resource substitution elasticity indicator. At that, scholars specify that to characterize the speed of the indicator change, a simpler indicator might be used (e.g.

a derivative) but elasticity substitution is preferred due to the fact that it is constant for most practically applied production functions, i.e. it does not change in movement along a certain isoquant (*Ivanilov and Lotov, 1979, p. 57*).

A derivative is used by the economist V. D. Zharikov (1986) who suggests estimating the speed of fixed assets depreciation which is important for planning their reproduction during the labour process and determined as the speed of productive consumption of fixed assets as the first time depreciation derivative (*Zharikov, 1986, p. 15*).

N. V. Kuzminchuk and O. Yu. Terovanesova (2016) suggest the indicator "speed of transformation of the resource and activity-related potential into activity in the current period in relation to the basic one" (Δk_E) which is determined considering such indicators as the speed of change of the "resource and activity-related functioning" indicator value in the current period in relation to the basic one and the speed of change of the "resource and activity-related potential" indicator value in the current period in relation to the basic one (ΔRARP). At that, $\Delta RARP \leq \Delta k_E$ presents the condition of the relation between the speed of change of the "resource and activity-related potential" indicator value and the indicator of its efficient transformation into the "resource and activity-related functioning" (*Kuzmynchuk and Terovanesova, 2016, p. 158*).

To determine directions and rates of the investment market development, I. M. Kobushko (2012) suggests the indicator of the speed of change of the competitive position on the investment market which characterizes competitors' actions intensity level (*Kobushko, 2012, p. 37*).

Thus, scholars use speed indicators to study various economic phenomena and processes but their application is fragmentary.

3. Methods.

The study applied general scientific theoretical methods: generalization, explanation, grouping – to analyze the views of economists on the object of study and formulate conclusions of the content analysis of primary sources, analysis and synthesis – to clarify the main scientific categories of research, justification of new conceptual provisions, principles, concepts and categories: "economic speed" and "economic acceleration"; schematic and graphical image – for visual presentation of the results.

4. Research objectives.

The article is aimed at systematizing of existing speed indicators used in economics when assessing and ensuring economic security of an enterprise.

5. Results and discussions.

Speed indicators are not quite new in economics as a whole and the science of security in particular. This is conditioned by their identification with indicators of indicator change rates that is widely covered in the theory of statistics and mathematical methods in economics. In particular, level change speeds are called rates; one level can be connected with several rates, each of which usually results in increase or decrease of the level value and the level change itself is determined by only the rates connected with them but the rates themselves may depend on any levels, other rates and auxiliary variables (*Ivanilov and Lotov, 1979, p. 260*).

The generalizing indicator of the speed of phenomenon change in time is the absolute increment. This indicator enables determining how much on average per time unit the level of the row (in absolute terms) should increase to reach the final level starting from the initial one within the given number of periods (e.g. years) (*Bashkatova, 2002, p. 76*).

On the whole, there are three kinds of speed singled out in statistics: absolute, relative and average that are determined by corresponding indicators (Table 1).

Thus, considering identification of change rates with speed, the known in equation used in analyzing business activities is interpreted in the following way: RStc < RSs < RSi, where RStc is the relative speed of the total capital advanced into an enterprise's activity; RSs is the relative speed of production sales; RSi is the relative speed of

income. This interpretation is the grounds for going deep into the temporal aspect as the traditional estimation through increase rates of corresponding indicator values gives no way for determining influence of time on its fulfilment.

Table 1. **Kinds of speeds in statistics**

Speed kind	Indicator	Description	Author, source
Absolute	Absolute increment indicator	Absolute increment is the difference between two levels, one of which is taken as the basis for comparison.	(*Marmoza, 2013, p. 415*)
Relative	Rate (increase ratio)	Relation between two levels one of which is taken as the basis for comparison. Demonstrates what fold each level is larger or smaller than the level taken as the basis for comparison. Can be presented as ratios or percentage.	(*Marmoza, 2013, p. 416*)
	Increment rate	The increment rate indicator characterizes the relative speed of the level change per time unit, demonstrates by what value (percentage) the level of the given time period or moment is larger (smaller) than the basis level.	(*Bashkatova, 2002, p. 74*)
Average	Average absolute increment	Characterizes the average speed of the level increase (decrease). For moment and interval rows of dynamics with equal intervals between dates it is calculated as the simple average of chain absolute increments or difference between the final and the starting level divided by the number of the row members decreased by one.	(*Marmoza, 2013, p. 422*)

Source: generalized by the authors (Bashkatova, 2002; Marmoza, 2013).

Another indicator connected with speed is acceleration which is the indicator change speed. In statistics, absolute acceleration is the difference between the next and the previous absolute increments; acceleration shows by what value this speed is greater or smaller than the previous one and may be a positive or a negative number (*Bashkatova, 2002, p. 75*). However, both economics as a whole and the science of security in particular do not pay due attention to application of acceleration. Its consideration when assessing enterprise development is a promising trend.

Generally, each level of the time row is known to contain three basic components: a trend, cyclic or seasonal fluctuations and a random component. Development properties are characterized through a tendency or trend equations reflecting both speed and acceleration (Table 2).

A trend is a general expression of actions of factors. However, the impact of each factor is not specified as time acts "on behalf" of all of them (*Karnachova and Chuprina, 2017*).

So, economics does not make use of the available powerful mathematical tools to the full extent. Most scientific papers focus on indices or rates of indicator change, whereas the synergetic effect could be obtained from simultaneous use of indicator dynamics and time dynamics.

Agreeing with V. V. Kyryi (2016), a certain backsliding in ideological breakthroughs concerning economic time should be noted (*Kyryi, 2016, p. 136*). As mentioned above, even in 1986 V. D. Zharikov applied the theory of derivatives to determination of the depreciation speed (*Zharikov, 1986*) but this theory has not found proper development since that time. However, we consider it quite appropriate for assessing the economic security level of an enterprise.

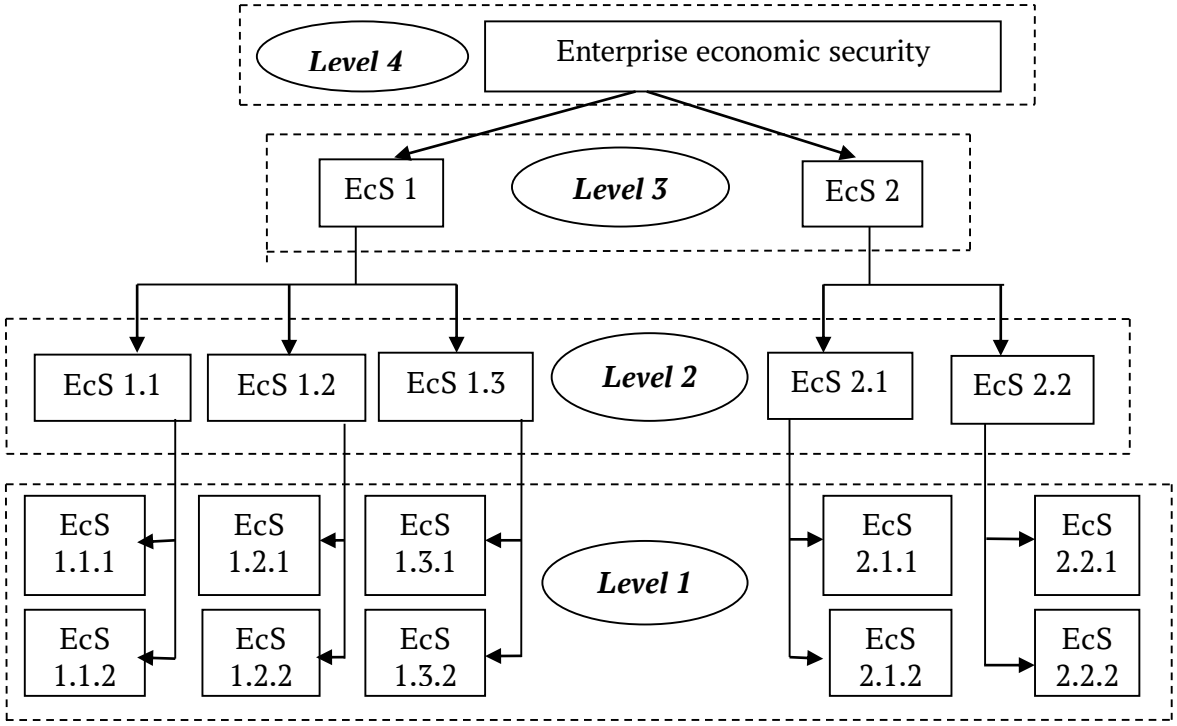
Table 2. **Speed and acceleration in various trend forms**

Trend form	Availability of speed and/or acceleration	Description
Linear $Y = a + b \cdot t$	b is the change speed, i.e. average change per time unit.	Describes processes steadily changing in time and having stable level increments. Reflects influence of multiple other factors simultaneously acting per time unit (a day, a month, a year, etc.). Here a trend can be treated as a generalized expression of actions of a number of factors, i.e. it is their resultant.
Parabolic $Y = a + b \cdot t + c \cdot t^2$	b is the change speed; c is the quadratic parameter of the parabolic trend equal to half of the acceleration.	Reflects acceleration or deceleration of development at constant acceleration caused by important factors.
Exponential $Y = a \cdot k^t$	k is the average speed of level changes: when $b > 1$ levels show steady increase; when $b < 1$, the levels decrease.	If characterized by the stable relative speed (increment rate), the process is described by the exponent able to take various equivalent forms.
Logarithmic $Y = a + b \cdot \ln t$	b is the change speed.	This form reflects tendencies of decelerating growth without a marginal possible value. The form is characteristic of development of indicators which can hardly be enhanced.
Power $Y = a \cdot t^b$	b is the trend constant.	Used for reflecting processes with a various degree of proportionality of changes in time. The line of the power trend must pass through the origin of coordinates.
Hyperbolic $Y = a + b/t$	b is the change speed.	Reflects deceleration of the tendency of the level decrease tending to a when $b > 0$. Reflects the tendency of deceleration of the level increase tending to a when $b < 0$. The hyperbolic trend is capable of reflecting tendencies of processes limited by marginal level values.

Note: Y is indicator levels not subjected to fluctuations; a is the starting trend level at the moment taken as time reference point t.

Source: generalized by the authors (Karnachova and Chuprina, 2017; Kozak and Matskul, 2016, p. 78).

Methodological principles of the assessment of the kind are based on the hierarchal structure of economic security and its components. Traditionally, scholars see the economic security structure as a kind of hierarchy with economic security components located on different levels. The lowest level contains the simplest elements that are united into more complicated economic security components on higher levels. In their turn, on much higher levels the more complicated components form separate kinds of economic security. As a rule, these are complex components (e.g. social-environmental security) to assess which scholars use complicated multi-component or integrated indicators. The mentioned procedure is observed up to the highest level where enterprise economic security itself is located. When presenting the methodological principles of assessing the economic security level developed by us, the essence or details of components are of no importance. It is the hierarchal structure that matters. That is why, to visualize proposals developed by us, we present the conventional hierarchal structure of economic security in Fig. 1.



Note: EcS with numbers stands for the kind and corresponding sub-kind of economic security, i.e. its separate components.

Fig. 1. **Conventional hierarchal structure of enterprise economic security**

Source: author's own developments.

So, to provide economic security in general and each of its components in particular, an enterprise should estimate necessary resources for implementing corresponding measures. The most important resources here are money and time.

Every kind and sub-kind of economic security are assessed with the help of corresponding indicators. In most cases, certain indicators are typical of the economic security components that we call elementary ones and which are located on the first hierarchal level. These indicators can be expressed by both absolute and relative values. Then, to assess economic security components located on the upper hierarchal levels, the number of obvious indicators reduces and scholars develop special complex indicators that results in the problem of integrating heterogeneous indicators in a single indicator of economic security assessment and creates an agglomeration of specific indicators inappropriate for practical use. This problem can be settled through use of time as the indicator accumulating actions of various factors.

Applying the indicator (normative) approach mentioned above, forecast values of corresponding indicators characterizing the elemental components of the first hierarchal level of economic security should be established. This is done to determine the time period during which the indicator will reach its normative value or the value required by the enterprise to provide a certain level of economic security. It should be noted that normative values when assessing the economic security level within the current period differ from those determined during strategic assessment: both the desired and normative values of the indicators change. To determine the time period, equations of trend (see Table 2) or other forecasting methods can be applied. In particular, the level of the elemental component of economic security can be calculated as the function of time:

L (EcS 1.1.1) = f (T 1.1.1), (1)

where L (EcS 1.1.1) is the level of economic security of sub-kind 1.1.1;

T 1.1.1 is the time necessary for the indicator characterizing economic security of sub-kind 1.1.1 to reach its normative (desired) value.

The corresponding time period for other components of economic security of the first level is estimated similarly (EcS 1.1.2 – EcS 2.2.2).

Time necessary for achieving the appropriate level of economic security levels located on the second level of the hierarchy (see Fig. 1) is determined in two ways. Depending on the economic content of a certain component and business processes, it is determined through either the maximum or the sum of periods found with the help of components of the first hierarchal level. For instance,

T 1.1 = max (T 1.1.1; T 1.1.2), (2)

T 2.1 = T 2.1.1 + T 2.1.2, (3)

where T 1.1, T 2.1 are the time necessary for achieving the desired level of the economic security components located on the second hierarchal level;

T 1.1.1, T 1.1.2, T 2.1.1, T 2.1.2 are the time periods necessary for indicators characterizing economic security components (1.1.1, 1.1.2, 2.1.1, 2.1.2 respectively) to reach their normative (desired) values.

Depending on their content, the other economic security components (EcS 1.2, 1.3, 2.2, Fig. 1) are determined according to formula (2) or (3).

The kinds of economic security located on the third level (see Fig. 1) do not have simple indicators. For their assessment, in most cases integrated (complex) indicators are developed (in particular, applying regressive models). That is why, the time necessary for reaching the appropriate economic security level is determined in two ways: forecasting and building a new function or applying the logic of formulas (2) and/or (3).

In any case, at this stage it is necessary to take into account values of speeds and acceleration (if any) of corresponding changes of indicators that, in their turn, impact achievement and provision of the appropriate level of enterprise economic security. Speed is known to be a derivative of distance; acceleration is a derivative of speed or the second derivative of distance. Assuming that the indicator value estimated as of a certain date is its distance from the zero value, speeds of changes of corresponding indicators can be determined:

$$v_i = i_j^{/}(t), \quad (4)$$

$$a_i = v_i^{/}(t) = i_j^{//}(t), \quad (5)$$

where v_i is the speed of the change of the i-th indicator that characterizes the corresponding j-th economic security component;

$i_j^{/}(t)$ is the first derivative of the indicator that characterizes the corresponding j-th economic security component;

$v_i^{/}(t)$ is the first derivative of the speed of the change of the i-th indicator that characterizes the corresponding j-th economic security component;

a_i is acceleration of the change of the i-th indicator that characterises the corresponding j-th economic security component;

$i_j^{//}(t)$ is the second derivative of the indicator that characterizes the corresponding j-th economic security component.

Thus, it is reasonable to use speed and acceleration as adjusting coefficients (weight coefficients) when determining time necessary for achieving the appropriate level of economic security by its kinds located on the third level. For instance:

$$T1 = \frac{v1.1*T1.1+v1.2*T1.2+v1.3*T1.3}{v1.1+v1.2+v1.3}, \quad (6)$$

where T_i is the time necessary for achieving the planned (desired) level of economic security kind 1 located on the third level of the hierarchy;

v1.1, v1.2, v1.3 are the speed of changes of indicators that characterize components 1.1, 1.2 and 1.3 respectively of economic security.

The time for achieving the planned (desired) level of economic security kind 2 is calculated similarly.

The total time for reaching the whole economic security of the planned (appropriate, desired) level should be determined according to similar principles adjusting it by speed and acceleration indicators. Besides, it is reasonable to consider the stage of the current economic cycle and the life cycle stage of the enterprise.

On the other hand, time is not a renewable resource. So, it should be rated. The specific character of certain aspects of financial and economic activities of an enterprise itself sets up rates of time (e.g. terms stated in contracts, various commercial agreements, etc.). Other aspects require setting up additional rates. In our opinion, rate time is represented by two kinds of periods. The first one is the rated time allocated for fulfilment of a certain operation (process) which when exceeded results in consequences affecting the economic security level. The second one is the rated time itself necessary for reaching the established economic security level on the whole and each of its components in particular. These periods are suggested to be correlated with the economic cycle length (in the current period – the Kitchin cycle).

Depending on the value of the rated time, it is reasonable to determine not only new normative values of corresponding economic security indicators but also normative values of speed and acceleration.

Thus, at the final stage it is reasonable to compare actual (T_a), forecast (T_f) and normative (T_n) time required for achieving and ensuring economic security on each of its components and in general. At this, the following inequations should be fulfilled:

$$T_n > T_f > T_a, \quad (7)$$

$$v_n < v_f < v_a, \quad (8)$$

where v_n, v_f, v_a are normative, forecast and actual speeds of changes of the economic security level of an enterprise respectively.

Thus, in terms of the economic time concept which is gaining wider application among scholars (*Derev'ianko, 2012*), we suggest using the concepts "economic speed" and "economic acceleration". These categories differ from their analogues in other scientific areas. The specific character of economic speed and economic acceleration consists in their contents connected with analogue differences between economic and astronomical time. Methods of estimating economic speed and acceleration and the sphere of their application in economics are logical manifestations of such differences.

6. Conclusions.

Thus, economists have narrowed the role of speed mainly to increase or increment indicators. The economic essence of speed is not revealed, its possible application in the science of security is insufficiently covered though the science is the one where it is speed in most cases that significantly impacts the future of an enterprise. Development of methods of assessment of economic security based on rating indicators of time and speed as well as disclosure of specificity of economic speed and economic acceleration are prospective directions and the line of our further research.

References

Bashkatova, B.I. (2002), *Social'no-jekonomicheskaja statistika* [Socio-economic statistics], JuNITI-DANA, Moccow, Russia, 703 p.

Derev'ianko, Yu. M. (2012), "Trends in the analysis of the time factor in modern economic research", *Mekhanizm rehulyuvannya ekonomiky*, no. 3, pp. 133–139.

Dontsova, L. V. and Nikiforova, N. A. (2000), *Formirovanie i ocenka pokazatelej promezhutochnoj (kvartal'noj) i godovoj otchetnosti* [Formation and evaluation of indicators of interim (quarterly) and annual reporting], Delo i Servis, Moccow, Russia, 272 p.

Gates, B. (2001), *Biznes so skorost'ju mysli* [*Business. The Speed of Thought*], JeKSMO-Press, Moccow, Russia, 480 p.

Hrinenko, A. Yu. (2018), "Determination of factors and forecasting indicators of economic security of the state", *Naukovyy visnyk Uzhhorods'koho natsional'noho universytetu*, vol. 17, part 1, pp. 72–76.

Ivanilov, Ju. P., and Lotov, A. V. (1979), *Matematicheskie modeli v jekonomike. Nauka* [Mathematical models in economics. The science], Glavna redakcija fiziko-matematicheskoj literatury, Moccow, Russia, 304 p.

Karnachova, I. O. and Chuprina, M. O. (2017), "Modern information technology in the analysis and forecasting of production and economic activity of the enterprise", *Aktualni problemy ekonomiky ta upravlinnya: zbirnyk naukovykh prats molodykh vchenykh*, vol. 11, available at: http://ela.kpi.ua/handle/123456789/22548 (Accessed *09 Fabruary* 2018).

Kobushko, I. M. (2012), "Determining the level of competition in the stock market as the leading segment of the investment market", *Ekonomika Ukrayin*, no. 9, pp. 33–46.

Kozak, Yu. H. and Matskul V. M. (2016), *Matematychni metody ta modeli dlya mahistrantiv z ekonomiky. Praktychni zastosuvannya* [Mathematical methods and models for magistrantov z economics. Practical zasosuvannya], Tsentr uchbovoyi literatury, Kyiv, Ukraine, 252 p.

Kuzmynchuk, N. V. and Terovanesova, O. Yu. (2016), "Assessment of the level and implementation of the resource and activity potential of engineering enterprises", *Biznes Inform*, no. 12, pp. 154–159.

Kyryi, V. V. (2016), "Study of the specifics of the use of the time factor in modern economic processes", *Traektorija nauki*, no. 5(10), pp. 136–143.

Marmoza, A. T. (2013), *Teoriya statystyky* [Statistical theory], Tsentr uchbovoyi literatury, Kyiv, Ukraine, 592 p.

Medvedev, M. Ju. (2001), *Obshhaja teorija ucheta: estestvennyj, buhgalterskij i komp'juternyj metody* [General theory of accounting: natural, accounting and computer methods], Delo i Servis, Moccow, Russia, 752 p.

Petrenko, L. M. (2010), "Evaluation and directions for improving the business activity of an enterprise", *Naukovi pratsi Kirovohradskoho natsionalnoho tekhnichnoho universytetu. Ekonomichni nauky*, vol. 18, issue 1, pp. 101–105.

Poljak, G. B. (ed.) (2001), *Finansy. Denezhnoe obrashhenie. Kredit* [Finance. Money turnover. Credit], JUNITI–DANA, Moccow, Russia, 512 p.

Savickaja, G. V. (2000), *Analiz hozjajstvennoj dejatel'nosti* [Business Analysis], Novoe znanie, Minsk, Belarus, 688 p.

Sheremet, A. D. and Negashev, E. V. (1999), *Metodika finansovogo analiza* [Methods of financial analysis], INFRA–M, Moccow, Russia, 208 p.

Vihanskij, O. S. and Naumov, A. I. (2003), *Menedzhment* [Management], Gardariki, Moccow, Russia, 528 p.

Zharikov, V. D. (1986), *Prognozirovanie potrebnosti ob'edinenij v oborudovanii* [Forecasting the need for equipment associations], Jekonomika, Moccow, Russia, 112 p.