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ASSESSING THE ECONOMIC STABILITY OF AN ENTERPRISE

Introduction

Economic stability is one of the major economic categories around which the development of all management measures and decisions about vital activity of all enterprises is accomplished. Studies in assessing the economic stability becomes important in crisis situations, which might be in the companies of different countries.

Analysis of recent researches and publications

The problem of assessing the economic stability was studied by such leading foreign and local scientists as: K. Bloomfield, E. Brihem, E. Beltensperher, Erich A. Helfert. B. Buchwald, E. Dolan, P. Drucker, N. Markowitz, R. Merton, Robert C. Higgins. Rubert J., Jouni Korhonen, J. Sincki, Wolfgang Gerstlbrger, Mettle Praest Knudsen, Ian Stampe etc [1 – 6]. There is a concept defined of economic stability and content elements, methods of assessing stability, ways of regulating economic stability in scientific publications of these scientists. In general there are four basic approaches to

single out the matter : a state of enterprise or resources that ensure effective functioning; a balance in economic development of the enterprise; the enterprise's ability to return to original state; a system which has components related to each other. It is impossible to isolate the static stability, which is reflected in maintaining proportion levels of indicators and dynamic stability - in preserving the existing regulatory trends of value changes of their consistency that characterizes the development of the enterprise.

Previously unsettled problem constituent

The ambiguity of interpretation of assessing the economic stability of an enterprise and its substantial nature and structural components lead to ambiguities in reflection of the system of indicators and determining factors external and internal environment and assessment process in general. It's important set of analytical tools in evaluation procedures of economic stability to determine overall level of the cause-and-effect relationships that form on the enterprise, study the optimal condition, development prediction. The experts on economic stability in their writings did not pay sufficient attention to substantiation tool set for its definition that indicates aspect but neither complexity nor solid reasons were evaluated.

Main purpose of the article

For assessing the economic stability the following structural components should be determined: 1) structural component of enterprise resource capabilities that was formed by costly stability, production stability and financial stability; 2) resistance as to working period (initial stability and stability of functioning); 3) stability in various types of markets (product market stability, stability in the market of production, stability of the financial market); 4)

stability to existing destabilizing factors: internal (technological, organizational, financial, economic, social) and external (economic, social, political, financial, demographic, scientific and technical). All this at the conceptual level expresses the economic stability as a set of characteristics that reflect the dynamic consistency elements of the enterprise as an economic system, which is manifested in sustainability causal relationship mechanisms to ensure the proper functioning and maintaining regulatory trends change values of economic indicators of the enterprise, that indicates homeostasis in the operation and economic development of the company.

The following methodological approach and sequence of stages are proposed for the evaluation of economic stability and prediction of an enterprise: studying of the conceptual content of economic stability of an enterprise and justification the process of evaluation and formation of the indicator system that describes the components of economic stability; influence analysis of environmental factors for the economic stability of enterprises and detection of destabilizing factors; determining internal latent factors in each component of economic stability for detection of close elemental interconnections; determining internal intersystem interconnections between components of economic stability and ranking influence between indicators; identifying the most significant indicators that provide close interconnections inside the system to ensure economic stability; calculating of the optimal values of parameters which are the most influential on the economic stability of the enterprise; definition permissible deviations of partial indicators on the enterprise; economic analysis of causes deviations from optimal values; calculating of the integral index of economic stability of the enterprise by building a taxonomic development indicator; identification of the level of economic stability by using scale values; prediction values of partial indicators of the economic stability for monitoring in the near future; developing measures for correction of enterprise's life to ensure economic stability.

Methodical approach allows us to objectively determine the level of economic stability, to carry out its assessment for developing of the effective management measures for the sustainable development of the enterprise.

Basic material with substantiation of the result of the research

The results of research of the economic stability and recommendations of leading scientists and experts indicate the necessity of its evaluation by the system of indicators, structured by following components (Table 1).

Table 1

The system of indicators for assessing the economic stability of the enterprise

Compo nents	Indexes
1. The structural component of enterprise resource capabilities	
1.1 Expenditure stability	the price ratio products to industry standards (x_1), the level of product profitability (x_2), compliance with industry standards of product quality (x_3), growth / cost reduction (x_4), the proportion of spending on sales promotion (x_5), the proportion of spending on modernization of production (x_6), the proportion of spending on the introduction of new technologies or new products (x_7)
1.2. Production stability	the rate of capacity utilization (x_8), the number embedded in new technologies (x_9), the proportion of the costs of purchase machines, equipment, tools and other fixed assets and capital costs associated with the implementation of innovations in total spending on innovation (x_{10}), the capital-labor ratio (x_{11}), matched volume set of resources they need (x_{12}), implementation of

	normative value stocks (x_{13}), the proportion of employees who improved their qualification in the year (x_{14}), the proportion of workers aged under 50 years (x_{15}), the proportion of employees who perform scientific and technical work (x_{16}), the degree of depreciation of fixed assets (x_{17}), the share their own equipment in total assets (x_{18}), growth rate of labor productivity (x_{19}), return on assets (x_{20}), assets (x_{21})
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Continued Table. 1

Compo nents	Indexes
1.3.Finan cial stability	financial autonomy ratio (x_{22}), the factor structure of term deposits (x_{23}), the factor of financial stability (x_{24}), total coverage ratio (x_{25}), absolute liquidity ratio (x_{26}), current ratio (x_{27}), turnover ratio of capital (x_{28}), accounts receivable turnover ratio (x_{29}), inventory turnover ratio (x_{30}), profitability sales (x_{31}), return on equity (x_{32}), profitability of enterprise (x_{33})
2. Resistance on the period of work	
2.1. Stability of operation	the ratio between the value of the property business and its accounts payable (x_{34}), the rate of accumulation of wear (x_{35}), self-financing ratio (x_{36}), the level of performance plans (x_{37}), the level speakers plans (x_{38}), the proportion of units with independent balance (x_{39}), availability of funds of the company for each unit (x_{40}), the degree of responsibility for the units (x_{41}), the area of risk for the company (x_{42})
3. Stability on various types of markets	

<p>3.1.</p> <p>Stability on the market goods and services</p>	<p>the share of new products (x_{43}), coefficient update on commodity nomenclature (x_{44}), the share of warranty costs (x_{45}), the proportion of products subject to warranty (x_{46}), economic efficiency of export (x_{47}), index of physical volume of products exported (x_{48}), the rate of return funds invested in export operations (x_{49})</p>
<p>3.2.</p> <p>Stability on the market of production</p>	<p>growth of income from renting property (x_{50}), the share of property used as collateral for borrowed funds (x_{51}), the proportion of deliveries under direct contracts (x_{52}), the share infringements supply agreements (x_{53}), the share of receivables in the media company (x_{54})</p>

This system of indicators comprehensive reflects signs of economic stability, and meets the requirements that apply to the system of indicators in the assessment [7].

We know that the economic stability of enterprises is influenced by external and internal environmental factors. Among the environmental factors the most powerful and destabilizing factors should be defined. The analysis of these factors, based on the the impact strength and possibility of arising and makes it possible to determine the most influential and destabilizing environmental factors such as: national economic factors (unfavorable fiscal policy, inflation, unfavorable monetary policy, raider attacks, a significant growth rate of the national currency), international economic factors (lack of interest in the Ukrainian market, rising oil price and energy price, the global economic crisis), social -political threats (political crisis, changing priorities of consumers, worsening demographic situation in the country). Common internal factors destabilizing economic viability include: factors associated with low levels of organizational personnel (inefficient system of staff motivation, high turnover, poor management) and low level of the enterprise (non plans of the

enterprise, ineffective enterprise strategy and organizational structure of the enterprise).

Despite the effect of destabilizing factors it is possible to regulate the economic stability of the company using internal causal relationships between metrics that express each of the components: cost, production, financial stability on the period of employment; stability on commodity markets and capital goods. It is appropriate to carry on the analysis of cause-effect relationships through the use of multivariate statistical methods such as factor analysis and canonical analysis for determining the relationship between partial indicators and components that allow to set the rating intersystem relationship indicators. The assessment of internal relationships in the economic stability of an enterprise is carried out by the following sequence of steps: determining of the conceptual content of the economic stability of an enterprise; formation of partial indicators that describe the components of economic stability; determining of internal latent factors in each component for the detection of close relationships between the elements; detailed economic analysis of the most significant indicators; determining internal intersystem relationships between components of economic stability and ranking impact indicators; identifying the most significant indicators that provide close relationships inside the system to ensure the economic stability of an enterprise. This sequence of steps was implemented for such investigated enterprises as PJSC "Turboatom", PJSC "Plant Juzhkabel", PJSC "Kharkov Bearing Plant", PJSC "Avtramat", PJSC "Kharkiv Machine-Tool Plant".

The analysis of factor loading indicators in latent schedule factors in each component of economic stability and analysis of intersystem interconnection indicators rating based on canonical analysis led to the conclusion that the most closely interrelated metrics are : the profitability of production; the share of spending on modernization of production; the share of spending on the introduction of new technologies or new products; capital-labor ratio; the

proportion of workers under the age of 50 years; the rate of structure long-term deposits; the rate financial stability; absolute liquidity ratio; the rate between the value of its assets and accounts payable; rate of self-financing; the availability of funds in the company for each unit; the rate update commodity nomenclature; the share of products subject to warranty; the rate of return funds invested in export operations; the share property used as collateral for borrowed funds; the proportion of direct supply contracts; the share infringements supply agreements; the share receivables in assets. Therefore, the management measures that aimed to change the values of these indicators and provide the fastest regulation of the economic stability of the enterprise.

Management of economic stability involves taking decisions, that allow to get the optimal results, and it is important to take into account the realities of the enterprise. There should be a close relationship between the structural elements of economic stability and maintaining the optimum relationship between them to achieve maximum performance of the enterprise. It is necessary to base the enterprise management of economic stability on solving an optimization problem, which allows to find the optimal values of partial indicators that meaningfully reflect the stability and the objective function, taking into account the causal relationships in achieving effective extremum criterion of the enterprise. According to the rating impact on the economic stability of the surveyed enterprises, the self-financing rate was the most significant, because it was taken as a dependent feature. As a function of the goals, the defined regression coefficient of self latent impacts (F) in each component of the economic stability of the enterprise, namely:

$$x_{36} = 0,6247 - 0,0202F_1^2 + 0,0212F_2^2 + 0,0111F_4^2 - 0,0279F_1^3 + 0,0264F_1^4 + 0,0106F_2^5.$$

$$t_a = 130,8 \quad t_{b_1} = -5,14 \quad t_{b_2} = 2,72 \quad t_{b_3} = 2,29 \quad t_{b_4} = -5,74 \quad t_{b_5} = 5,43 \quad t_{b_6} = 2,06.$$

The calculated multifactor regression model statistically qualitative, as the rate of determination ($R^2 = 0,9483$), the value of criterion Fisher ($F = 131,63$), the value of criterion Durbin - Watson ($DW = 1,8699$), Student's t test values (t)

confirm it. According to the specification, all nineteen latent factors of six components of the economic stability of the surveyed enterprises were included to the multifactor regression model ; there are six significant factors remained in the model. Factors of expenditure component and factors of component positioning on the market of means of production are not significant; Factors of production influence self-financing rate most of all , there are three of them (F_1^2, F_2^2, F_4^2) and, one factor is the financial component (F_1^3) component operation (F_1^4) and component of company position on products and services market (F_1^5). Since the latent factors of partial indicators of economic stability linked linearly, the appearance of the objective function of maximizing self-financing enterprises as follows:

$$\begin{aligned}
F_{(x_{36})} = & 0,6247 - 0,0202(0,438x_8 + 0,742x_9 + 0,816x_{10} + 0,85x_{11} - 0,47x_{15} + 0,82x_{20} + \\
& + 0,842x_{21}) + 0,0212(0,521x_8 + 0,314x_{10} + 0,853x_{14} + 0,819x_{15} + 0,54x_{16} - 0,692x_{17} - \\
& - 0,368x_{21}) + 0,0111(0,662x_{12} + 0,362x_{14} + 0,831x_{19}) - 0,0279(-0,873x_{22} + 0,860x_{23} - \\
& - 0,605x_{24} - 0,488x_{26} - 0,334x_{27} + 0,850x_{28} + 0,883x_{29} + 0,904x_{30} - 0,386x_{31} - \\
& - 0,377x_{33}) + 0,0264(0,650x_{34} + 0,802x_{38} - 0,386x_{39} + 0,392x_{40}) + \\
& + 0,0106(0,845x_{43} + 0,499x_{44} - 0,565x_{46} + 0,337x_{47}) \rightarrow \max .
\end{aligned}$$

For substantiation the restriction system of optimization problem was used descriptive statistics tools. For each enterprise has been formed the separate system of limitations, such as for the enterprise PJSC "Turboatom" which presented below:

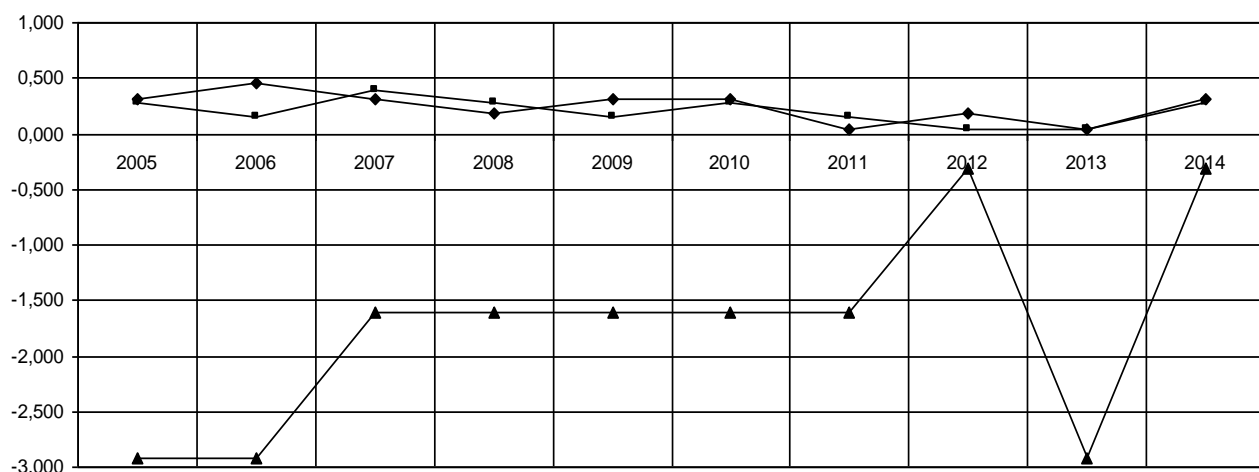
$$\begin{aligned}
0,6101 \leq x_8 \leq 0,7299 , \quad & 0,7506 \leq x_9 \leq 3,2494 , \quad & 0,2399 \leq x_{10} \leq 0,363 , \\
0,0 \leq x_{11} \leq 27602,6 & & \\
0,42362 \leq x_{12} \leq 1,07638 , & & 0,00967 \leq x_{14} \leq 0,01333 , \\
0,52829 \leq x_{15} \leq 0,54871 , \quad & 0,0209 \leq x_{16} \leq 0,0222 , \quad & 0,3663 \leq x_{17} \leq 0,5137 , \\
0,9697 \leq x_{19} \leq 1,0903 , \quad & 0,1078 \leq x_{20} \leq 0,1322 , \quad & 1,4106 \leq x_{21} \leq 1,5094 ,
\end{aligned}$$

$0,79432 \leq x_{22} \leq 0,86468$, $5,3244 \leq x_{24} \leq 6,1656$, $0,7952 \leq x_{26} \leq 0,9758$,
 $1,1913 \leq x_{27} \leq 1,4267$, $0,0019 \leq x_{28} \leq 0,0031$, $0,0102 \leq x_{29} \leq 0,0208$,
 $0,0068 \leq x_{30} \leq 0,0092$, $0,1426 \leq x_{31} \leq 0,3314$, $0,0136 \leq x_{33} \leq 0,0854$,
 $3,2017 \leq x_{34} \leq 3,5973$, $1,0155 \leq x_{38} \leq 1,0645$, $0,0369 \leq x_{43} \leq 0,0731$,
 $0,0469 \leq x_{44} \leq 0,0831$, $0,0077 \leq x_{46} \leq 0,0323$. Optimal values of indicators
which characterize the economic stability for this enterprise: $x_8 = 0,7299$,
 $x_9 = 0,7506$, $x_{10} = 0,23987$, $x_{11} = 0,0$, $x_{12} = 1,0764$, $x_{14} = 0,0133$, $x_{15} = 0,5487$,
 $x_{16} = 0,0222$, $x_{17} = 0,3663$, $x_{19} = 1,0903$, $x_{20} = 0,1078$, $x_{21} = 1,4106$,
 $x_{22} = 0,8808$, $x_{23} = 0,8647$, $x_{24} = 6,1656$, $x_{26} = 0,9758$, $x_{27} = 1,4267$,
 $x_{28} = 0,0019$, $x_{29} = 0,0102$, $x_{30} = 0,0068$, $x_{31} = 0,3314$, $x_{33} = 0,0854$,
 $x_{34} = 3,5973$, $x_{38} = 1,0645$, $x_{43} = 0,0731$, $x_{44} = 0,0831$, $x_{46} = 0,0077$.

At the same time values of the self-financing coefficient that is a criteria of the enterprise will be maximal and it will be equal to 0.84482. This high level of self-financing can be at the minimum values of certain indicators of economic stability. Determination of absolute and relative deviations reached values of economic stability indicators comparing with optimal allows to establish the intervals of scatter and to diagnose critical areas of violation the economic stability.

So the dynamics of relative deviations values of stability on the market of goods and services, such as the proportion of new products (x_{43}), coefficient update commodity nomenclature (x_{44}) and the share of products were subjected to a warranty (x_{46}) presented at Fig. 1.

Significant deviations values of the particle production that had a warranty, from optimal values ensure this type of stability thus we can conclude that even such deviations from optimal values strengthening the stability and don't lead any fluctuations in the system.



—◆— E_{x43} – relative deviations the share of new products
 —■— E_{x44} – relative deviations the update coefficient of commodity nomenclature
 —▲— E_{x46} – relative deviations the proportion of products which had the warranty

Fig. 1. Dynamics relative deviations values (E) indicators of stability on the market of goods and services from the optimal values PJSC "Turboatom"

In the management the economic stability of industrial enterprises is important to know the level of development that is an integral indicator that reflects comprehensively the state of economic stability and to predict changes of indicators that characterize it.

There are integrated indicators the economic stability of analyzed enterprises which were calculated by using the mathematical method of constructing the taxonomic index of development (Table. 2).

**The value of the integral index of economic stability of enterprise (I_{ec})
during 2005 - 2014**

The enterprise	Research period (years)									
	005	006	007	008	009	010	011	012	013	014
PJS C "Turboatom"	,290	,276	,423	,370	,139	,335	,273	,454	,497	,498
PJS C "Kharkov Bearing Plant"	,242	,361	,425	,351	,180	,173	,281	,445	,399	,467
PJS C "Kharkiv Machine-Tool Plant"	,296	,324	,342	,388	,083	,282	,389	,442	,486	,401
PJS C "Plant Juzhkabel"	,218	,282	,340	,230	,046	,248	,299	,314	,266	,303
PJS C "Avtramat"	,343	,304	,413	,394	,110	,200	,378	,229	,302	,261

To identify the level of economic stability was developed the values scale

of this value on the basis of a distribution of values and calculated numerical characteristics the aggregate value of integral index of economic stability: average value 0,3164 (I_{ec}), median 0,314, variance 0,0114, standard deviation 0,1067, minimum 0,046, maximum 0,498, scatter values 0,452. To identify the level of economic stability of industrial enterprises which were researched, we have such intervals of change values of the integral index (Table. 3).

Table 3

Intervals of changes the values of the integral index of economic stability at analyzed enterprises

	$\bar{I}_{ec} - 3\sigma$	$\bar{I}_{ec} - 2\sigma$	$\bar{I}_{ec} - \sigma$	$\bar{I}_{ec} + \sigma$	$\bar{I}_{ec} + 2\sigma$	$\bar{I}_{ec} + 3\sigma$
Values of reference	0,000	0,103	0,2097	0,4231	0,5298	0,6365
Intervals	[0, 0,103)	[0,103, 0,3164)	[0,3164, 0,4231)	[0,4231, 0,6365)	[0,6365, 1]	
Level	Crisis	Critical	Nonequilibrium	Equilibrium	Close to perfect	

At PJSC "Turboatom" during the last three years has been persisting an equilibrium. It concerns to the PJSC "Kharkiv Machine-Tool Plant" and PJSC "Kharkov Bearing Plant". As for the economic stability of PJSC "Avtramat" it was crisis-critical during 2005-2014, that is threats the activity of the enterprise.

To develop an effective management measures it needs to know forecast values as partial indicators and the overall level of the economic stability in every enterprise. In this article was calculated the growth curves for

prediction of economic stability indicators at the enterprises that were researched. Thus, for PJSC "Turboatom" the model of forecast values the indicator of capital productivity (x_{21}) the model: $x_{21} = 1,355 + 0,045\sqrt{t}$; ($R^2 = 92,27$; $F = 83,64$; $DW = 2,01$, it indicates about the statistical quality of the model). The expected values of this indicator are: 2015 – 1,506, in 2016 – 1,512, in 2017 – 1,512.

The dynamics of this index for ten years and predicted values have showed positive growth trend. Determined values of the economic stability allow to build the tree of goals to ensure the economic stability of the enterprise.

Conclusions and directions of feather researches

The proposed approach to the evaluation of the economic stability of the enterprise has advantages because it takes into account the causal relationships that warn the system from sudden destabilizing factors and it turns into a state of an equilibrium.

Assessment results of the economic stability at the enterprise can serve as analytical and scientific information background for developing new strategies for the enterprise activity, and can be used for monitoring the implementation of existing strategies at the enterprise.

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SUMMARY

The article deals with an essence of the content and methodical approach to the evaluation of economic stability of the enterprise. Proposed substantive essence of the economic stability of the enterprise viewed by components: structural component of the enterprise resource capabilities, that forms costly stability, production stability and financial stability; economic stability on the period of work (initial stability and stability operation); economic stability in different types of markets (product market stability, stability on the market of production, stability of the financial market); resistance to existing destabilizing factors, both internal (technological, organizational, financial, economic, social) and external (economic, social, political, financial, demographic, scientific and technical). The methodical approach to the evaluation of economic stability, implemented by stages, which has the difference in analytical instruments. It was recommended for assessing the economic stability of the enterprise using tools of multidimensional factor analysis method - to identify factors influencing on the internal environment for economic stability; optimization models - to find the optimal values of economic stability, method of construction the

development of taxonomic index - to determine the level of economic stability;
model growth curves - to forecast values of the economic stability.

Keywords: definition of economic stability, components of economic stability, system of indicators, methodical approach assessing the economic stability of the enterprise, tools to assess.

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