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THE SYSTEM OF FORMATION OF THE ANALYTICAL INDICATORS AS A BASE FOR THE ECONOMIC ANALYSIS OF THE FINANCIAL CONDITION OF THE ENTERPRISE

The article is devoted to the problem of selection of the system of indicators for the detailed analysis of the financial condition of the enterprise, the logic of which is set on the basis of the enterprise's financial statements.

***Keywords**: economic analysis, financial condition, financial coefficients, the system of indicators, systematization, verification, permissible multicolliniarity, model, method, pair correlation.*

The reform of the national system of counting, the application of the accounting and statistical standards (System of National Accounts – SNA), the reform of the accounting through harmonization and standardization led to the change in the information model of the economic system. In its turn, it resulted in the modern development of the economic analysis of the financial condition of the enterprise and the economic analysis in general. Thus, some analytical comprehension is required for such typical characteristics of the information quality criteria developed by the Eurostat as expediency, accuracy of data, topicality, comprehensibility and quality, comparability and interrelation of separate data with the data from other sources [3, 9].

Efficiency of the economic analysis of the financial condition of the enterprise, as an interlink between the financial management and accounting, on the one hand, and the information user and the factor of the formation of the target information support for the management process, on the other hand, assumes to a great extent the use of all available sources of information. As a result, the quality of ensuring the financial management, effectiveness of management mostly depends on the complexity, scope, depth and quality of the information system and the economic analysis in the area of which it is done [2, 3].

Various theoretical, methodological and organizational aspects of the problems of systematization and processing of the economic information are described in the works of such Ukrainian scientists as E.V. Mnykh [2], Y.S. Tsal-Tsalko [3], O.V. Oliynyk [4], V.G. Shvets [8], etc. and the Russian scientists – S.B. Barngolz, V.V. Kovayov, A.D. Sheremet and others.

Despite the apparent importance, value and effectiveness of the scientific apparatus that helps implement and improve the system of indicators for the economic analysis, not all of its aspects in the field of estimation of the financial condition of enterprises are sufficiently theoretically developed and are able to meet the requirements of the activation of the modern managerial activities.

It is common knowledge that the development of the system of indicators always has a relative and creative nature. Thus, in order not to put accents on a somewhat controversial

system of notions and categories of the system of indicators, not to carry out the comprehensive revision and specification of definitions, but to make further clear and consistent formulations of our own understanding of the category apparatus, the scientific and practical tools of the analyst, it is proposed to use our own selective approach to the formation of the system of indicators of the financial condition of the enterprise.

The purpose of this article is to develop and modify the existing methods of constructing the system of indicators of the economic analysis of the financial condition of the enterprise as a stage of the economic analysis to create a methodological framework, which would be a basis or a starting point for further specific calculations, analysis, substantiation and selection of the optimal strategic management decisions, as well as the possible variants of development.

The term "the system of indicators" is widely used in the economic research. It is the complexity of the analysis that assumes the use of some sets of indicators. According to the fixed criteria one has to select the indicators, to create a system with them and to conduct its analysis. Of course, not every set of indicators could be considered a system. In comparison with the individual indicators or their set, the system is a qualitatively new formation and is always more important than the sum of its individual parts, because in addition to representation of some parts of the phenomenon (process, object), which is researched, it has the specific information on what will appear in the result of the interaction between these individual parts, that is, the information about the development of the phenomenon as a whole.

Construction of the full-scaled system of indicators is based on the clear understanding of two things: what the system means and what basic requirements it should meet. The definition of the notion "the system of indicators" is presented quite well in the scientific and educational works [1, 6, 7].

Hereinafter, the system of indicators means their arranged multiplicity, in which each indicator gives a quantitative and qualitative characteristic to the specific part of the condition and development of the subject or phenomenon in conjunction with other indicators, but does not duplicate them. The properties of aggregation and divisibility are typical for it. For pragmatic semantization and the use, the system of indicators must meet some requirements. Among them, there are the most important ones, which have a methodological significance. They are: a) the necessary scope of coverage of all parts of the investigated subject or phenomenon by the system indicators; b) the interrelation between these indicators; c) verification.

One should note the importance of the verification, i.e. identification of veracity (the possibility to check). Textbooks, tutorials and some monographic publications devopted to the economic analysis often contain indicators with the unclear algorithm of their calculations and the information support. The cognitive value of these indicators is rather doubtful. Therefore, in the annual reports of the Western companies as well as in the Methodological regulations on statistics of the State Statistics Committee of Ukraine there are the sections with the description of the algorithms of calculations of key indicators.

We believe that in the process of the formation of the system of economic indicators one should be guided by some principles, but the implementation of these principles in reality is often constrained by some specific circumstances. The following principles are the most important:

1. The principle of the dendrogram structure of the system of indicators – providing the logical "coagulation" of individual indicators into the generalized indicators. This logic is not something radically new, it is used quite widely in different kinds of analysis.

2. The principle of comprehensibility – it assumes the presence of the set of indicators, which is optimum for this enterprise. So, the indicators of the system must be quite multicollenear.

3. The principle of optimal combination of absolute and relative indicators.

The most suitable for constructing the system of indicators are relative and specific values. Their prevalence is due to the fact that they have some advantages over the absolute values – they enable us to compare the objects, which cannot be compared with the absolute values, they give us an opportunity to eliminate the impact of some economic factors (e.g., inflation, revaluation, etc.), are more stable in time and space, i.e., they characterize more homogeneous variational series (in the context of their belonging to the law of distribution close to normal), which is a significant factor for the correct processing of data with the help of economic and mathematical methods.

4. The system of economic indicators must correspond to the principle of informality. It means that the system must have a maximum degree of analyticity, give an opportunity to evaluate the current financial condition of the enterprise and prospects of its development, as well as be suitable for making administrative decisions and be based primarily on the financial statements because the financial reporting is the most reliable information support for the process of economic analysis of the financial condition of the enterprise, and the data generated by the accounting department, is considered the most (and often absolutely) accurate in comparison with other economic information.

Let's assume, a priori, the information that on the basis of absolute values of the financial statements one can calculate more than 200 relative analytical indicators, which can be used for describing the financial condition of the enterprise [1,2]. But it is well known that in the countries with the market economies more than 80 financial ratios are used for the analysis of the financial condition and financial results [2].

Being guided by the maximum informativeness and the principle of permissible multicollinearity for the development of the methodology for making a comprehensive assessment of the financial condition of the enterprises, there were selected 56 financial indicators, which formed the content of the information space of the research. Those indicators were grouped into 10 functional subsystems, each of which can characterize the relevant aspect of the activities of the business entities and has a direct or indirect impact on the financial condition of the enterprise, namely:

1) liquidity ratios (5 coefficients); 2) coefficients of the structure of the funds sources (6 coefficients); 3) ratios of the turnover of the floating funds (working, functioning capital) (8

coefficients); 4) coefficients of the capital turnover and the transformation of the assets (5 coefficients); 5) ratios of business activity: the turnover of accounts receivable and payable (4 coefficients); 6) coefficients of business activity: the coefficients of the resource productive capacity (5 coefficients); 7) efficiency ratios: the total efficiency (7 coefficients); 8) profitability ratios: the total profitability of the capital (5 coefficients); 9) efficiency of the property use (7 coefficients); 10) the analysis of the position of the enterprise on the securities market (5 coefficients).

The algorithm of the calculation of the formation of the system for making the analysis on the basis of the descriptive models can be described as a sequence of operations:

1. Based on the information presented in the periodic reporting forms regulated by the state (Regulations (Standards) of Accounting), the indices of all indicators (coefficients) are calculated. Furthermore, it creates the database of financial statements, as a rule, for 10-13 periods (for annual reporting) and it is desirable, but not less than 15 periods (for quarterly reporting).

2. Graphs on the change of coefficients' values are built depending on the periods where one can identify the nature of the dependence (trend), the parameters of the trend, the recommended limits of the change of the coefficient and the coefficient of multiple correlation (the value of the reliability of approximation) and, if necessary, other characteristics.

Thus, in order to describe the time series, the functional dependence (hereinafter – the model) is determined. It allows to obtain a set of artificial data in the form of time series.

If one takes into account the accuracy of the model only, then it can lead to choosing not the one of the highest quality. Despite this fact, when choosing the models, in the practice of the economic analysis one is often limited to the analysis of the final variation, which, in fact, defines the degree of the model fitting to the known values of attributes. When modeling the values of the indicators of the new objects, the discrepancy between the estimated and actual values of attributes can be quite substantial.

Thus, the accuracy of the forecast for the output data does not guarantee a high quality of the model that is the sufficient accuracy and reliability of the estimates of the values of the resultant indicator by all possible values of the factor features.

But, on the other hand, the model describing the time series allows not only to extrapolate the quantitative characteristics of the indicators, but also to better understand the scenario of the behaviour of these series. In spite of the fact that for the analysis we need the reliable forecasts of the behavior of indicators, it would be too imprudent to expect for the absolute accuracy of the extrapolation results, because the desired accuracy is virtually unattainable, since it is impossible to predict the truly unexpected event based on the definition.

A lot of different approaches and methods are used for the analysis of time series. They are evolving and developing with time. The most popular among the modern methods of the analysis of time series is the analysis of trends and ARIMA processes of Box-Jenkins [2]. By virtue of simplicity and aiming to reduce computing, we have elected the first one. It is a direct, intuitive approach to assess the basic components of the quarterly and annual time series.

This deep statistical understanding of the behaviour of the indicator's dynamics is, without doubt, useful as the basic information for the future analysis (paraparaphs 3, 4, 5).

3. Using the information about the dynamics of the absolute values in terms of reporting forms, on the basis of which the indicators (coefficients) are calculated, as well as the calculations made in paragraphs 1,2, the analysis of the dynamics of each coefficient is made, the well-grounded conclusions are presented, which indicate the main reasons for the change of the coefficient for the items of the balance sheet.

4. The analytical notes are prepared for the functional subsystems of indicators. Based on the findings, they give the total detailed description of the activities of the enterprise by each subsystem of indicators.

5. After the implementation of paragraphs 1-4 the general analytical note of the entire system of indicators is made. It gives a full fundamental complex description of the enterprise in terms of all subsystems in general, the financial condition and recommendations for the further effective functioning.

One of the urgent problems is to establish the recommended limits for the coefficients change. Determination of the methods of their establishment should not depend on the subjectivity of experts or performers, but be clearly specified.

In the practice we have determined the recommended limits according to the current GAAP standards, taking into account the national industrial features, as well as the considerations of specialists [1, 2, 5, 7, 8], and our personal experience.

The proposed methogy differs from the existing methodologies by the fact that it has been developed and finalized not only as the system of indicators, but it also implies the sequential analysis of the indicators. This set of data belongs to the category of time series. Of course, the time series is not a random sample from a universe (the exception is the process of pure random number), but it requires some transformation and application of special methods, which consider a certain correlation between the indicators [1, 2].

In addition, the proposed three-stage scheme of the sequential analysis (the analysis of the indicator's dynamics change $\Rightarrow$ the analysis of the dynamics of the functional subsystems of the indicators $\Rightarrow$ the analysis of the dynamics of the system of the indicators in general) allows us to comprehensively and, in our opinion, the most accurately assess the financial condition of the enterprise.

When making the in-depth comprehensive economic analysis of the financial condition, a focus on large volumes of information, which were intended for the data analysis, led to the fact that unsystematic flows, which not always give an opportunity to use the information appropriately and to learn it, aroused the annihilation of the necessary information.

The practical implementation of the descriptive models assumes the selection of the indicators, using the principle of the elimination of multicollinearity. Of course, one can use any method to eliminate the multicollinearity, but, unfortunately, this procedure cannot be

unified, i.e. to clearly define the influential coefficients on the basis of which to form the information base for the economic analysis.

When forming the system of indicators to make the economic analysis of the financial condition of the enterprise with the aim of reducing the number of calculations and improving the efficiency in the express analysis of the financial condition of the enterprise, we have proposed a heuristic method of the permissible multicollinearity. It has the acceptable (proven) characteristics. The algorithm of the method can be as follows:

1. The financial ratios are calculated $\left\{a_{ij}\right\}_{i=\overline{1,n}\ ;j=\overline{1,m}}$ (n – the number of analytical indicators (coefficients), m – the number of periods, as a rule, $m \geq 7$) of all functional subsystems mentioned above;

2. The correlation matrix is built for each subsystem and the system of indicators in general $\left\{\rho_{ir}\right\}$ ($\left\{\rho_{is}^{l}\right\}_{i=1,n;s=\overline{1,n_k}}^{l=\overline{1,L}} \in \left\{\rho_{ir}\right\}$, n_k – the number of indicators in the subsystem k, L – the number of subsystem, $\sum_{k=1}^{L} n_k = i$, $i = r$);

3. For all correlation coefficients the permissible value of a correlation coefficient is set – Ω^D;

4. The pairs of coefficients are determined, for which $\left\{\rho_{ir}\right\}_{ir=\overline{1,n}} \geq \Omega^D$;

5. For the correlation coefficients from paragraph 4, the coefficients are found for which $\left\{\rho_{i,r}\right\}_{i,r=\overline{1,n}} = \max_{\rho_{ir} > \Omega^D} \left\{\rho_{ir}\right\}_{i,r=\overline{1,n}}$;

6. For each pair of coefficients from paragraph 5 $\sum_{i=1}^{n}\left|\rho_{ir}\right|$ і $\sum_{r=1}^{n}\left|\rho_{ir}\right|$ are calculated;

7. $\Theta_{i',r'} = \max_{\left|\rho_{ir}\right|} \left(\sum_{i=1}^{n}\left|\rho_{ir}\right|, \sum_{r=1}^{n}\left|\rho_{ir}\right|\right)$ is calculated;

8. The indicator with coordinates (i', r') is excluded from the system.

While making the express and detailed economic analyses of the financial condition of the enterprise, the usage of the permissible multicollinearity method allowed us to reduce the number of iterative calculations as much as twice and to get the acceptable results. And the difference in quantitative calculations, when analyzing with other methods, is not more than the allowable error and has only the theoretical value with no impact on the quality of the analysis.

On the other hand, sometimes it is necessary to consider the interrelated values for the quantative description. So, for instance, when making the comprehensive and thorough analysis of the financial condition of the enterprise, such indicators as the ratio of turnover of current assets (the share of proceeds in floating assets – $K_{pr.fl.as.}$), the period of turnover of the current assets (the average time from investing into production to receiving funds

from the products' sales) and the coefficient of fixing the current assets ($K_{fix.cur.as.} = 1/K_{pr.fl.as.}$) are interrelated in the time space (the correlation coefficient – $\mid r \mid \geq 0,95$), but the absence of even one of these indicators can significantly reduce the efficiency of the analysis of the functioning (working capital) in particular, and the financial condition of the enterprise in general.

Therefore, the requirements for the necessary sufficiency of the input data are, firstly, undoubtedly topical and, secondly, do not have a single solution.

Despite the fact that all ideas presented in this article have been tested and proved by practice, in no case they should be absolutized. They have been developed in order to systematize the content of the analytical procedures in addition to the assessment of the financial condition of the enterprise.

Along with the problem of formation of the system of indicators for the analysis of the financial condition of the enterprise, there are some situations where due to the lack of the relevant structures of the integral (rating) assessments, which are the core of the financial and economic activities, the efficiency of management decisions is significantly decreasing. But this is a topic of other scientific studies.

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СИСТЕМА ФОРМУВАННЯ АНАЛІТИЧНИХ ПОКАЗНИКІВ ЯК ОСНОВА ЕКОНОМІЧНОГО АНАЛІЗУ ФІНАНСОВОГО СТАНУ ПІДПРИЄМСТВА

Стаття присвячена проблемі добору системи показників при поглибленому аналізі фінансового стану підприємства, логіка якого задається на основі фінансової звітності підприємства.

Ключові слова: економічний аналіз, фінансовий стан, фінансові коефіцієнти, система показників, систематизація, верифікація, допустима мультиколініарність, модель, метод, парна кореляція.

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СИСТЕМА ФОРМИРОВАНИЯ АНАЛИТИЧЕСКИХ ПОКАЗАТЕЛЕЙ КАК ОСНОВА ЭКОНОМИЧЕСКОГО АНАЛИЗА ФИНАНСОВОГО СОСТОЯНИЯ ПРЕДПРИЯТИЯ

Статья посвящена проблеме отбора системы показателей при углубленном анализе финансового состояния предприятия, логика которого задается на основе финансовой отчетности предприятия.

Ключевые слова: экономический анализ, финансовое состояние, финансовые коэффициенты, система показателей, систематизация, верификация, допустимая мультиколиниарность, модель, метод, парная корреляция.