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FINANCIAL SECURITY DIAGNOSTICS TOOLS FOR CORPORATE ENTERPRISES

Abstract. In order to diagnose internal financial threats to the financial security of domestic corporate enterprises, a three-pronged system of assessment of their financial security has been proposed, in which it is proposed to include a classic financial analysis tool, financial stability assessment toolkit and value management toolkit.

Coefficient and discriminant statistical models are used within the classical tools of financial analysis. In order to increase the informativeness of the coefficient model and ensure its comprehensiveness, a matrix for diagnosing internal financial threats to the financial security of a corporate enterprise has been developed, in which the level of financial security is determined by assessing the state of financial performance, grouped into regulatory conformity classes. On the basis of discriminatory statistical models, a model is proposed for assessing the level of financial security of corporate enterprises, depending on the peculiarities of the scale of indicative values of the most popular models of bankruptcy risk diagnosis.

To diagnose financial security, a model for assessing the financial stability of operational activities has been proposed as part of the financial stability assessment tool, that measures the level of financial security of corporate enterprises by classifying financial situations according to their degree of stability, depending on the composition and structure of sources of supply requirements for reserve formation. A matrix for diagnosing the internal financial threats to the financial security of a corporate enterprise based on the modified financial reporting model has been developed as a generic tool for measuring financial stability, which allows the determination of the level of financial security by linking indicators of financial stability, solvency and financial risk. Based on the modification of the financial equilibrium matrix, a model has been developed for diagnosing the internal financial threats to the financial security of the enterprise, according to which the level of financial security is determined by the financial soundness zone, depending on the forecasts of the special aggregates.

Value-based management (VBM) and balanced scorecard (BSC) are justified to provide an effective strategic management tool with enhanced forecasting capabilities to assess the financial security of corporate enterprises and to propose appropriate tools based on the cascading of financial indicators.

Keywords: corporate enterprise, financial security, level of financial security, financial security diagnostic system, financial stability, toolbox, evaluation model, diagnostic matrix.

JEL Classification G32, M2

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ІНСТРУМЕНТАРІЙ ДІАГНОСТИКИ ФІНАНСОВОЇ БЕЗПЕКИ КОРПОРАТИВНИХ ПІДПРИЄМСТВ

Анотація. Для діагностики внутрішніх фінансових загроз фінансовій безпеці вітчизняних корпоративних підприємств запропоновано трикомпонентну систему оцінювання їхньої фінансової безпеки, до складу якої пропонуємо включити класичний інструментарій фінансового аналізу, інструментарій оцінювання фінансової стійкості та інструментарій вартісно-орієнтованого управління.

У межах класичного інструментарію фінансового аналізу використано коефіцієнтну і дискримінантні статистичні моделі. Для підвищення ступеня інформативності коефіцієнтної моделі та забезпечення її комплексності розроблено матрицю діагностики внутрішніх фінансових загроз фінансовій безпеці корпоративного підприємства, у якій рівень фінансової безпеки визначається на основі оцінювання стану фінансових показників, згрупованих у класи за критерієм відповідності нормативним значенням. На основі дискримінантних статистичних моделей запропоновано модель оцінювання рівня фінансової безпеки корпоративних підприємств залежно від особливостей шкали індикативних значень найбільш популярних моделей діагностики ймовірності настання банкрутства.

Для діагностики фінансової безпеки у складі інструментарію оцінювання фінансової стійкості запропоновано модель оцінювання рівня фінансової стійкості операційної діяльності, яка дозволяє визначити рівень фінансової безпеки корпоративних підприємств на основі класифікації фінансових ситуацій за ступенем їхньої стійкості залежно від складу і структури джерел задоволення потреб у ресурсах для формування запасів. Узагальнювальним інструментом визначення фінансової стійкості розроблено матрицю діагностики внутрішніх фінансових загроз фінансовій безпеці корпоративного підприємства на основі моделі модифікованої фінансової звітності, яка дозволяє визначити рівень фінансової безпеки шляхом установлення взаємозв'язку індикаторів фінансової стійкості, платоспроможності та фінансового ризику. На основі модифікації матриці фінансової рівноваги розроблено модель діагностики внутрішніх фінансових загроз фінансовій безпеці підприємства, згідно з якою рівень фінансової безпеки визначається зоною фінансової стійкості залежно від прогнозних значень спеціальних узагальнювальних показників.

З метою отримання ефективного інструменту стратегічного управління з посиленими можливостями прогнозування обґрунтовано доцільність використання вартісно-орієнтованого управління (VBM) і збалансованої системи показників (BSC) для оцінювання фінансової безпеки корпоративних підприємств і запропоновано відповідний інструментарій на основі каскадування фінансових показників.

Ключові слова: корпоративне підприємство, фінансова безпека, рівень фінансової безпеки, система діагностики фінансової безпеки, фінансова стійкість, інструментарій, модель оцінювання, матриця діагностики.

Формул: 7; рис.: 1; табл.: 6; бібл.: 21.

Introduction. In the process of transforming national economies, the role of corporate entities in the system of economic and social partnership is increasing. Corporate enterprises, as the most common form of business organization, accumulating economic entities of different sectoral and territorial characteristics, form the basis of the economies of most countries of the world. Taking into account the current state of formation and development of the corporate sector of the national economy, issues of the characteristics of the safe and efficient functioning of corporate enterprises are of particular relevance.

Research analysis and problem statement. The work of many scientists is devoted to the functioning of modern corporate enterprises [1—5]. An analysis of the work of the above-mentioned scientists shows that the researchers mainly focused on general aspects of the theory and practice of corporate enterprises. At the same time, issues of assessing the financial security of corporate enterprises, given the variety of external and internal threats to their functioning, remain beyond the scope of the authors' attention.

The purpose of the article. The aim of the article is to prove the tools of the diagnosis of the financial safety of corporate enterprises.

Methods of research. The research methods used in writing an article using general scientific and empirical techniques based on a systems approach. The following methods of general theoretical and empirical research were used in the article: generalization, comparison, analysis and synthesis, formalization, modeling.

Research results. The corporate form of business is at the forefront of modern economic life in almost every country in the world.

It should be noted that the adoption of the Commercial [6] and Civil Codes of Ukraine [7] created a legislative basis for the functioning of the corporate form of entrepreneurship, legally legitimizing the substantive characteristics and organizational and legal forms of corporate enterprises. Considering the peculiarities of functioning, the corporate enterprise as an economic category reflects the system of economic (socio-economic) relations between the entities of the internal institutional environment on participation in capital formation/property, activities, management, profit, and risk-sharing [1, p. 628].

An effective financial security system is one of the most important conditions for ensuring sustainable growth and generating positive results in the financial and economic activities of a corporate enterprise.

In general terms, the financial security of an economic entity is the quantitatively and qualitatively determined level of its financial status, ensure stable protection of priority balanced financial interests from identified real and potential threats of external and internal characteristics, the parameters of which are determined on the basis of its financial philosophy and create the necessary prerequisites for financial support for its sustainable growth in the current and future periods [8, p. 97].

The financial security of an economic entity should be considered as a system that makes it possible to identify potential threats and risks, and to find effective and prompt ways of counteracting them guarantees a stable financial state, the possibility of further development and survival. To do this, it is necessary to constantly diagnose threats to its financial security, which constitute potential or actual actions of natural or legal persons, the company's security is compromised and may result in the cessation of its activities or economic and other losses.

Modern corporate enterprises operate under the influence of a complex set of external and internal factors, primarily manifesting themselves in a multitude of financial threats, which result in significant costs and losses, as a result, the level of financial sustainability and the level of financial risk increased.

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The following methodological approaches are proposed for the diagnosis of domestic financial threats to the financial security of domestic corporate enterprises (*Table 1*).

Table 1

Financial security assessment system of corporate enterprises

Components of the system	Methodical approaches
I. Classic tools of financial analysis	1. Matrix of financial condition indicators based on the coefficient model. 2. Discriminant statistical models of the bankruptcy probability.
II. Financial stability assessment tools	1. Models for assessing the level of financial stability of operating activities. 2. Financial condition diagnostics matrix based on modified financial statements. 3. Matrix of financial equilibrium based on forecasting summary indicators.
III. Value based management tools	1. Model «VBM–EVA–BSC».

Source: compiled by the authors.

First of all, the classic tools of financial analysis include a coefficient model for assessing the financial condition in terms of the following groups of indicators: profitability, business activity, solvency and liquidity, financial stability. In order to make the model more informative and comprehensive, it is proposed to group the financial indicators into a matrix (*Table 2*).

Table 2

Matrix for diagnosing internal financial threats to the financial security of a corporate enterprise based on the use of a coefficient model

Trends	Status of first class indicators	Status of second class indicators	Assessment	Level of financial security
Normative value	1.1. Very good	1. Improvements	Perfectly	***Absolute***
	1.2. Normally — very good		Very good	***High***
	1.3. Normally	2. Stability	Good	***Normal***
Non-compliance with regulations	2.1. Satisfactory — normal		Normally	***Acceptable***
	2.2.Unsatisfactory — satisfactory	3. Deterioration	Satisfactory	***Satisfactory***
	2.3. Unsatisfactory		Unsatisfactory	***Unsatisfactory***

Source: compiled by the authors.

I. Indicators for which a normative value or first-class indicators are defined are capital structure coefficients, revolving asset ratios, financial stability coefficients, and the solvency of an enterprise. The following conditions are used to estimate them:

1. «Standard compliance» in three states: «Very good» — the value of the indicator fully corresponds to the normative value, or approaches it; «Normally — very well»: the values of the indicators are stable and at the normative level — the assessment is «very good»; if the values of indicators at the boundary of the corridor of stable values — estimation «normal»; «Normal» — values of indicators at the level of norms, but the trend of values moving from the middle of the corridor to the boundaries of norms are observed.

2. «Non-compliance with standards» in terms of three states: «Satisfactorily-normal» — values of indicators outside the norms, but there is a tendency to improve — evaluation «normal» or «satisfactory» depending on the size of the deviations and the speed of movement to the normative values; «Unsatisfactory-satisfactory» — the values of the indicators constantly deviate from the normative — the assessment is «satisfactory» or «unsatisfactory» depending on the level of deviations; «Unsatisfactory» — the values of the indicators are constantly deviating from the normative tendency of deterioration of the indicators —the assessment is «unsatisfactory».

II. Indicators for which no standard values are usually set, or second-class indicators — absolute measures of financial stability, measures of cash flow structure, business performance, and leverage efficiency. The following conditions are used for their evaluation: «Improvement»; «Stability»; «Deterioration».

The well-known discriminant statistical models of bankruptcy probability diagnosis (E. Altman [9], R. Taffler and H. Tisshaw [10], J. Conan and M. Holder [11], V. Springate [12], R. Lis [13], O. Tereshchenko [14], and others) are specially calculated discriminant function, the reasons for which the financial indicator ratios are used are the most important for the development of the crisis, and their values (Z-account) make it possible to identify the degree (probability) of a corporate bankruptcy threat.

Depending on the peculiarities of the indicative scale, it is proposed that the financial security of a corporate entity based on the most popular discriminatory statistical models be diagnosed as follows (*Table 3*).

Table 3

Model for assessing the level of financial security of corporate enterprises based on discriminant statistical models

Level of financial security	Model	Indicative values
High	O. Tereshchenko's model R. Lis's model Model of R. Taffler and H. Tisshaw Universal discriminant function 5-factor model of E. Altman W. Springate's model	Z > 2 Z > 0,037 Z > 0,3 Z > 2 Z > 2,9 Z < 0,862
Normal	O. Tereshchenko's model Universal discriminant function 5-factor model of E. Altman W. Springate's model	1 < Z< 2 1 < Z < 2 2,7 < Z < 2,9 0,862 < Z <2,451
Satisfactory	O. Tereshchenko's model Universal discriminant function 5-factor model of E. Altman Model of R. Taffler and H. Tisshaw	0 < Z < 1 0 < Z < 1 1,8 < Z ≤ 2,7 0,2 < Z < 0,3
Low	O. Tereshchenko's model R. Lis's model Model of R. Taffler and H. Tisshaw Universal discriminant function 5-factor model of E. Altman W. Springate's model	Z < 0 Z < 0,037 Z < 0,2 Z < 0 Z ≤ 1,8 Z > 2,451

Source: Compiled by the authors on the basis of [8—14].

A generic (spatial) measure of the financial security of a corporate enterprise should be considered as its financial soundness, which is the difference between the actual proceeds of implementation and the threshold of profitability (activity at a breakpoint). The financial safety margin is in fact a safety margin because it describes the permissible amount of reduction in the proceeds of disposal without significant damage to its financial position in the event of a deterioration in market conditions and other complications.

However, the achievement of high performance needs to be combined with a sound financial market position, based on financial sustainability and depends directly on the structure of the resources and the efficiency of their management.

First of all, it is possible to assess the optimum structure of the sources of financing by studying the absolute indicators of financial sustainability based on the determination of the sufficiency of the individual types of financing to ensure the current (operational) corporate business -—formation of a working capital head.

Existing methodologies for such analysis provide varying degrees of confidence in determining the financial sustainability of a corporate enterprise. The base can be considered as the system of calculation of the three-component indicator, which makes it possible to identify the type of financial situation depending on the composition and structure of the sources of satisfaction of the resource requirements for the formation of the economic entity's reserves [8, p. 56—58]

In order to make the methodology more informative, the authors propose the use of a model for assessing the financial sustainability of operations, based on a multi-tiered scheme of sources of financing of the working capital requirements of enterprises for the development of inventories.

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Depending on the size of the participation and the manner in which specific types of financing are selected, the availability of the inventory (S) is calculated by the possible sources of its generation: self-operating (C_{owc}); accounts payable (C_{ap}), and short-term loans (C_{stb}).

The set of results of comparison of different values of sources with the sum of stocks, which is expressed according to indicators ($\pm C^{owc}$; $\pm C^{owc+ap}$; $\pm C^{owc+stb}$) will classify financial situations according to the degree of their stability (*Table 4*), which are identified by the indicator $FS = \{FS(\pm C^{owc}), FS(\pm C^{owc+ap}), FS(\pm C^{owc+stb})\}$, where the function is defined as follows:

$$FS(x) = \begin{cases} 1, \ if \ x \geq 0 \\ 0, \ if \ x \langle 0 \end{cases}. \quad (1)$$

Table 4

Model for assessing the level of financial stability of operating activities in the system of diagnostics of financial security of corporate enterprises

Degree of financial stability	The content of the financial situation	Level of financial security
Financial stability I degree	$\begin{cases} \pm C^{owc} \geq 0 \\ \pm C^{owc+ap} \geq 0 \\ \pm C^{owc+stb} \geq 0 \end{cases}$ $FS_T = (1; 1; 1)$	***High***
Financial stability II degree	$\begin{cases} \pm C^{owc} \langle 0 \\ \pm C^{owc+ap} \geq 0 \\ \pm C^{owc+stb} \geq 0 \end{cases}$ $FS_T = (0; 1; 1)$	***Normal***
Financial stability III degree	$\begin{cases} \pm C^{owc} \langle 0 \\ \pm C^{owc+ap} \langle 0 \\ \pm C^{owc+stb} \geq 0 \end{cases}$ $FS_T = (0; 0; 1)$	***Low***

Source: Compiled by the authors on the basis of [8; 15—18].

This methodology, in our view, more realistically reflects the composition of the sources of external financing for the current activities of corporate enterprises, since, first, the priority of the selection of funds is respected, which makes it possible, depending on the structure of the sources, to assess their role in the formation of stocks and, secondly, to assess different ratios of funds or the advantage of some of them may indicate different degrees of financial resilience of economic agents in general terms of their ability to pay.

When all three indicators are negative, it is not appropriate to speak of any degree of financial soundness, and therefore of financial security, as the enterprise is on the verge of bankruptcy.

The generalization of financial stability in the financial security system of a corporate enterprise should be considered as the assessment of its position on the scale «financial stability - solvency - risk» based on the use of the modified balance sheet model, which involves the calculation of indicators of financial stability (I_{FS}), solvency (I_S), and financial safety or risk (I_R) according to the following formulas [15]:

$$I_{FS} = E - NFA = FA - D; \quad (2)$$

$$I_S = M_{FA} - D = E - NM_{FA}; \quad (3)$$

$$I_R = E - NLN_{FA}, \quad (4)$$

where E — equity; D — debt or borrowed capital; NFA, FA — non-financial and financial assets; M_{FA}, NM_{FA} — mobile and non-mobile financial assets; NLN_{FA} — non-financial illiquid assets.

In general, based on the modified financial statements model, it is proposed to diagnose the financial position of a corporate entity using three scales: financial stability, solvency, risk, and their relationships (*Table 5*).

Table 5

Matrix of diagnosis of internal financial threats to the financial security of an enterprise based on the modified financial reporting model

Financial stability scale		Solvency scale	Financial risk scale	Level of financial security
General	**Differentiated**			
Financial stability	Perfect stability $NM_A < E < EA$ $NM_{FA} < I_{FS} < FA$	Absolute solvency $0 < D < M_{FA}$ $NM_A < E < EA$ $0 < I_S < M_{FA}$	Maximum independence $NM_A < E < EA$ $NM_{FA}NLN_{FA} < I_R < LA$	***Absolute***
	Sufficient stability $0 < NFA < E < NMA$ $0 < I_{FS} < NM_{FA}$	Guaranteed solvency $M_{FA} < D < FA$ $NFA < E < NM_A$ $-NM_A < I_S < 0$	Optimal reliability $0 < NFA < E < NM_A$ $LN_{FA} < I_R < NM_{FA}NLN_{FA}$	***High***
Financial balance	$I_{FS} = 0, I_S < 0, I_R > 0$			***Normal***
Financial instability	Tension $0 < NLN_{FA} < E < NFA$ $-LN_{FA} < I_{FS} < 0$	Potential solvency $FA < D < LA$ $NLN_{FA} < E < NFA$ $-NM_{FA}NLN_{FA} < I_S - NM_A$	Relative security $NLN_{FA} < E < NFA$ $0 < I_R < NLN_{FA}$	***Acceptable***
	Risk area $0 < E < NLN_{FA}$ $-NFA < I_{FS} < -LN_{FA}$	Insolvency $LA < D < EA$ $0 < E < NLN_{FA}$ $-NM_A < I_S < -NM_{FA}NLN_{FA}$	Crisis risk $0 < E < NLN_{FA}$ $-NLN_{FA} < I_R < 0$	***Low***

Where NM_A — non-mobile assets; EA — amount of economic assets; LA — liquid assets, LN_{FA} — liquid non-financial (current) assets, $NM_{FA}NLN_{FA}$ — non-mobile financial and liquid non-financial assets.

Source: compiled by the authors on the basis of [15—17; 19].

Depending on the location of the enterprise in one of three states: stability, equilibrium, and instability, it is possible to define the limits of its safety and the risk of operating from absolute to low.

The matrix of financial equilibrium developed by J. Franchon and I. Romanet which provides a definition of forecast values of special generalizing indicators: a result of economic activity (*REA*), a result of financial activity can serve as the tool of an estimation of financial stability of the corporate enterprise in the context of diagnostics of its level of financial safety (*RFA*), and the result of economic and financial activities (*RFEA*) [15]:

$$REA = EBIT - FON - PI + PSP; \quad (5)$$

$$RFA = D_C - I_D - D_{IV} - T_{AX}; \quad (6)$$

$$RFEA = REA + RFA, \quad (7)$$

where *EBIT* — earnings before interests and tax; *FON* — change in financial and operational needs in the planning period; *PI* — production investments accepted for sale; *PSP* — proceeds from the sale of property, which is sustainable; D_C — change in debt expected in the planning period; I_D — interest on loans payable; D_{IV} — dividends to owners; T_{AX} — tax payments from profit.

In this context, the following model for assessing the financial security of a corporate enterprise is proposed to diagnose domestic financial security (*Table 6*).

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Table 6

Model of diagnostics of internal financial threats to financial security of the enterprise on the basis of a matrix of financial balance

Zone of financial stability	The content of the financial situation	Description of the situation	Level of financial security
«Zone of Success» Financial stability	$REA > 0, RFA > 0, RFEA >> 0$	«Slow growth — Acceleration»	***Absolute***
	$REA > 0, RFA \approx 0, RFEA > 0$	«Slow growth — Stabilization»	***Very high***
	$REA \approx 0, RFA > 0, RFEA > 0$	«Optimal growth —Acceleration»	***High***
Financial balance	$REA > 0, RFA < 0, RFEA = 0$	«Slow growth — Inhibition»	***Normal***
	$REA \approx 0, RFA \approx 0, RFEA \approx 0$	«Optimal growth — Stabilization»	
	$REA < 0, RFA > 0, RFEA = 0$	«Forced growth — Acceleration»	***Acceptable***
«Deficit zone» Financial instability	$REA \approx 0, RFA < 0, RFEA < 0$	«Optimal growth — Inhibition»	
	$REA < 0, RFA \approx 0, RFEA < 0$	«Forced growth — Stabilization»	***Satisfactory***
	$REA < 0, RFA < 0, RFEA << 0$	«Forced growth — Inhibition»	***Unsatisfactory***

Source: Compiled by the authors on the basis of [15; 19; 20].

Further more, according to the authors, modern methodological tools for diagnosing internal threats to the financial security of a corporate enterprise should not be limited to the classical methods discussed above, but should necessarily include the use of value-based management (VBM) and integrated systems aimed at measuring achievements — balanced scorecard system (BSC) [21].

In this context, it is proposed to integrate VBM financial indicators into the BSC balanced scorecard system, namely in its perspective «finance» as a key performance indicator, because the balanced system of indicators and the model of economic value added (EVA), as the basis of VBM, is organically integrated into both the financial planning and budgeting processes and the process of diagnosing and ensuring the financial security of the corporate enterprise; Provide for the possibility of cascading financial indicators and translating the developed strategy (e.g. financial or investment) from the level of top management to the level of strategic units, structural units, and individual implementers.

Accordingly, the list of financial indicators within the framework of the «VBM — EVA — BSC» model to be included in the system of diagnosis of internal threats to the financial security of the corporate enterprise is proposed to be divided into those necessary for the investor (owner) and financial services, strategic and current (*Fig.*).

The introduction of EVA, as well as other financial indicators of the VBM model, into the BSS financial outlook as a performance indicator, will allow in a certain sense «to close» the totality of the evaluations of the effectiveness of the achievement of the given tasks on one final financial indicator, which satisfies both the owner and the investor while maintaining sufficient attention to the system of indicators of other prospects, e.g. and non-financial.

On the other hand, combining the mathematical precision and unambiguity of estimation inherent in the EVA models and the VBM concept with the systematic approach to performance evaluation that characterizes the BSC, provides an effective strategic management tool with enhanced forecasting capabilities capable of achieving significant synergistic effects by guiding the corporate enterprise not only to diagnose threats but also to maximize costs.

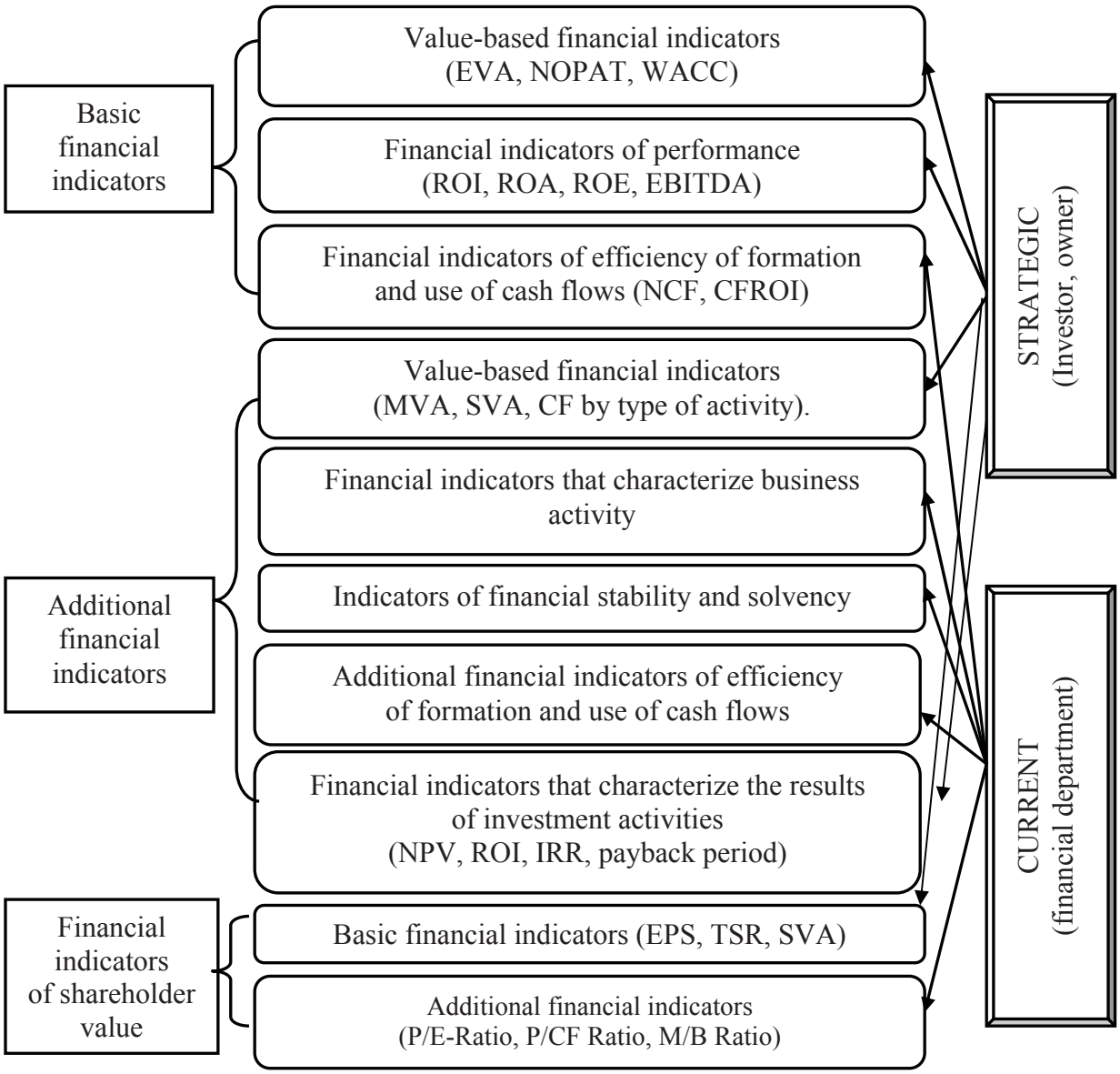

Fig. **Toolkit for diagnosing internal financial threats to the financial security of a corporate enterprise based on the VBM-EVA-BSC model**

Source: Compiled by the authors on the basis of [21].

Thus, the introduction of the proposed tool for diagnosing internal financial threats to the financial security of a corporate enterprise will help prevent the occurrence of financial and economic crises, identify the causes of financial problems and address them effectively. In addition, it will enable the investor (owner) to be informed promptly of the key financial performance and the degree of achievement of the planned results will allow responding to all changes and challenges of the market and will allow making informed management decisions.

Conclusions. The current state of development of the economy has highlighted a number of problems in the management of a corporate enterprise, among which one of the most topical to date can be considered to be the formation of a mechanism for assessing its financial security. Special attention should be paid to the justification of the system of evaluation indicators, which, in our view, should take into account certain characteristics of the action of the indicators:

1. The complex nature of the action is the ability of the financial security indicators to manifest themselves both separately and in combination. Nevertheless, it is useful to define different levels for individual indicators: for those that may become critical in conjunction with other indicators, and for those whose exceedance (or reduction) will cause a crisis independently.

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2. The need for a range of values — envisages the development of threshold values of indicators: minimum, maximum, maximum tolerable, which will significantly increase the informativeness of the derived calculations in terms of the degree of threats and hazards.

3. Focus of action — the focus of action is demonstrated by the fact that, with the help of certain indicators, it is possible to determine in advance nature, sources, direction, extent, and possible timing of hazards and threats.

4. Informativeness of action — characterized by the ability of indicators, on the one hand, to indicate existing or potential harm and, on the other hand, to measure the degree of ability to counteract hazards and threats.

In this way, the system of indicators will significantly increase the efficiency of corporate financial security management in general and the effectiveness of its assessment mechanism in particular.

In general, the comprehensive use of the proposed methodological tools for diagnosing internal financial threats will make it possible to significantly increase the informativeness and reliability of the results obtained, ensure the effectiveness of the process of diagnosing the financial security of corporate enterprises, and the development of a strategy for its future implementation, and will serve as a basis for further research and development in this area.

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