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MODELING AN ANTI-CRISIS INVESTMENT STRATEGY OF
ENTERPRISE UNDER THE THREAT OF BANKRUPTCYМОДЕЛЮВАННЯ АНТИКРИЗОВОЇ ІНВЕСТИЦІЙНОЇ СТРАТЕГІЇ
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The article is devoted to the modeling of the anti-crisis strategy in a high level of bankruptcy probability. The article presents three types of anti-crisis investment strategies, as well as a process of implementation and realization of focusing strategy on the dominant factor. In order to survive and successfully operate in the present conditions, enterprises need to

be competitive, and in order to achieve an adequate level of competitiveness, business entities need to focus on the production of such goods and services that are optimally suited to consumer demand in quality and at a price that is only possible in the case of conducting a well-balanced investment policy, which should be a permanent component of the crisis management of the enterprise and condition the essence of anti-crisis investment strategies in its activity ones. Finding the most effective investment strategy as a component of crisis management was conducted on the basis of actual financial and economic information of several manufacturing enterprises. Analysis has shown that the key indicators of the impact on the risk of bankruptcy for these enterprises are four indicators (factors): 1) turnover rate of stocks; 2) the coefficient of financial stability; 3) coefficient of personnel turnover; 4) the coefficient of information protection. The presence of several influential indicators necessitates the choice of such an investment strategy, which should be related to either one or a few, or with all the indicators. Taking into account the dynamics of modern economic development, as well as the possibility (and mobility) of various financial and economic priorities for the analyzed enterprises, the following variants of investment strategies are considered: 1) focusing strategy on the dominant factor; 2) polifactorial strategy; 3) the strategy of balancing. Therefore, in more detail, an example of focusing strategy on the dominant factor for the selected enterprise is considered, that is characterized by the essence and features of investment in order to achieve positive changes in the "factor of financial sustainability" as a dominant factor.

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Стаття присвячена моделюванню антикризової стратегії в умовах високого рівня ймовірності банкрутства. У статті представлено три види антикризових інвестиційних стратегій, а також запропонований процес імплементації та реалізації стратегії фокусування на факторі який домінує. Щоб вижити та успішно функціонувати за умов сьогодення, підприємства повинні бути конкурентоспроможними, а щоб досягти належного рівня конкурентоспроможності, суб'єктам господарювання потрібно зосередитися на виробництві таких товарів та послуг, які оптимально задовольнятимуть споживчий попит і за якістю, і за ціною, що можливо лише у разі ведення виваженої інвестиційної політики, яка має бути перманентною складовою антикризового управління підприємством і обумовлювати сутність антикризових інвестиційних стратегій в його діяльності. Пошук найбільш результативної інвестиційної стратегії, як складової антикризового управління проводиться на базі фактичної фінансово-економічної інформації декількох виробничих підприємств. Аналізування засвідчило, що ключовими індикаторами впливу на ризик банкрутства для названих підприємств є чотири показники (фактори): 1) коефіцієнт оборотності запасів; 2) коефіцієнт фінансової стійкості; 3) коефіцієнт плинності кадрів; 4) коефіцієнт захисту інформації. Наявність декількох впливових індикаторів зумовлює необхідність вибору такої інвестиційної стратегії, яка повинна бути пов'язана або з одним, або з кількома, або зі всіма індикаторами. Враховуючи динамічність сучасного економічного розвитку, а також можливість (та мобільність) різних фінансово-економічних пріоритетів для аналізованих підприємств розглянуто такі варіанти інвестиційних стратегій: 1) стратегія фокусування на факторі, який домінує; 2) поліфакторна стратегія; 3) стратегія балансування. Тому більш детально розглядається приклад стратегії фокусування на домінуючому факторі для обраного підприємства, який характеризується сутністю і особливостями інвестицій для досягнення позитивних змін в «коефіцієнті фінансової стійкості» як домінуючого фактора.

Keywords: investment strategy, implementation of the investment strategy, focusing strategy on the dominant factor, bankruptcy

Ключові слова: інвестиційна стратегія, імплементація інвестиційної стратегії, стратегія фокусування на факторі який домінує, банкрутство

INTRODUCTION

Under the current pace of technical and economic progress and the globalization of the economy, the crisis management doesn't lose its importance, but becomes more and more relevant. One of the important aspects is the understanding of the objectivity of crises and the need to implement special anti-crisis measures for business entities, since their activities are the basis of economic development of each country but the whole world economy, and at this level there are crisis phenomena's.

In order to survive and successfully operate in the present conditions, enterprises need to be competitive, and in order

to achieve an adequate level of competitiveness, business entities need to focus on the production of such goods and services that are optimally suited to consumer demand in quality and at a price that is only possible in the case of conducting a well-balanced investment policy, which should be a permanent component of the crisis management of the enterprise and condition the essence of anti-crisis investment strategies in its activity ones.

The research of methods and tools of crisis management, in particular, the essence and features of anti-crisis investment strategies, are the subject of scientific research by many domestic and foreign scientists and economists, in particular, such as: V. Vadvud [1], L. Martiusheva [2],

A. Telnova [3], W. Crandall [4], J. Riley [5], N. Augustine [6], C. Fronz [7], O. Tereschenko [8] and others.

In spite of the large number of scientific works, some of the issues that remain a constant object of discussion due to the dynamic state of the market environment, in particular, in our opinion, require the in-depth study of such issues: methods for assessing the financial security of the enterprise and the factor impact on the effectiveness of the investment strategy, modeling the essence of the anti-crisis investment strategy of the enterprise taking into account possible risks, developing options for address strategies for enterprises with different levels of danger bankruptcy, peculiarities of their realization and implementation.

The **PURPOSE** of the research is to determine and characterize the essence of the main methodological and organizational stages and calculations aimed at forming an investment strategy as an integral part of the crisis management activity of industrial enterprise.

RESULTS

Finding the most effective investment strategy as a component of crisis management was conducted on the basis of actual financial and economic information of several manufacturing enterprises. The evaluation of this information with the assistance of economic and mathematical modeling, namely, discriminant, correlation and regression analysis, showed that the objects of further research should be two enterprises from six analyzed ones, namely PJSC «Drohobyt'skyi mashynobudivnyi zavod» and PJSC «L'viv'skyi lokomotyvremontnyi zavod» because these economic entities are characterized by the presence of such financial and economic parameters that, in accordance with the chosen mathematical model for determining the state of financial security, have a high degree of bankruptcy risk.

Further analysis has shown that the key indicators of the impact on the risk of bankruptcy for these enterprises are four indicators (factors): 1) turnover rate of stocks; 2) the coefficient of financial stability; 3) coefficient of personnel turnover; 4) the coefficient of information protection. The presence of several influential indicators necessitates the choice of such an investment strategy, which should be related to either one or a few, or with all the indicators. Taking into account the dynamics of modern economic development, as well as the possibility (and mobility) of various financial and economic priorities for the analyzed enterprises, the following variants of investment strategies are considered: 1) focusing strategy on the dominant factor; 2) polifactorial strategy; 3) the strategy of balancing. The relevance of each of these strategies is different for each enterprise. Since the influence of each factors on the resulting sign is calculated using correlation and regression analysis, it can be argued that when the weight of one factor significantly differs from the weight of all others, then it is advisable to apply a focus strategy. If there are several factors of great importance, it is expedient to use a polyfactorial investment strategy. A balanced investment strategy needs to be implemented if the influence of factors varies considerably, as well as when there is a number of stakeholders that significantly affect the activities of the enterprise.

The figure 1 presents the essence of the named strate-

gies for PJSC «L'viv'skyi lokomotyvremontnyi zavod» taking into account the proposed measures that will have a positive effect on the key indicators that determine the risk of bankruptcy. These measures are the result of in-depth analysis of the real problems of the enterprise and the experience of solving similar problems in the Ukrainian and foreign industries.

According to the results of further research, in particular, the expert analysis, given in the "Map of recommendations for choosing the optimal investment strategy for preventing bankruptcy" (Figure 2), the largest sum of points (on a 10-point scale, where 1 is the worst value, and 10, respectively, the best way), according to experts, receives an investment strategy focusing on the prevailing factor, since the process of realization and implementation of this strategy is the least costly financial way and needs the least time. Therefore, in more detail, an example of such a strategy for the selected enterprise is considered – PJSC «L'viv'skyi lokomotyvremontnyi zavod», that is characterized by the essence and features of investment in order to achieve positive changes in the "factor of financial sustainability" as a dominant factor.

The development and implementation of any investment strategy involves its phased structuring with a definition for each stage of the duration, cost, as well as probable performers. The list and content of such stages of the investment strategy, oriented on the dominant factor (coefficient of financial stability), for PJSC «L'viv'skyi lokomotyvremontnyi zavod», is given in Table 1.

To implement this process, it is proposed to use the following steps:

I – brainstorming to find ideas for strategic change:

This stage involves the search for experts who would form several ideas for the effective development of the company by improving the efficiency of investment activity.

II – formation of new goals and tasks or their rebranding:

since there will be a change in the direction of investment activity of the enterprise, it will be necessary to set new goals and tasks for such activities, and also to reconcile them with the general objectives of the enterprise.

III – analysis of factors of the internal and external environment:

any enterprise is considered as an open system, so, its functioning and development are influenced by various internal and external factors. The main characteristic of the environment is its uncertainty and the risks associated with it.

IV – development a several versions of investment strategy:

the development of any strategy, including investment, provides for the creation of several versions, an analysis of the effectiveness of each and the selection of the most optimal.

V – achievement the systemic of the strategy (alignment of investment strategy with other elements of the general strategy of enterprise development):

investment strategy is one of many elements of the overall strategy for enterprise development, therefore, it is necessary to reconcile the new investment strategy with other strategies: marketing, logistics, social, commodity, price and others.

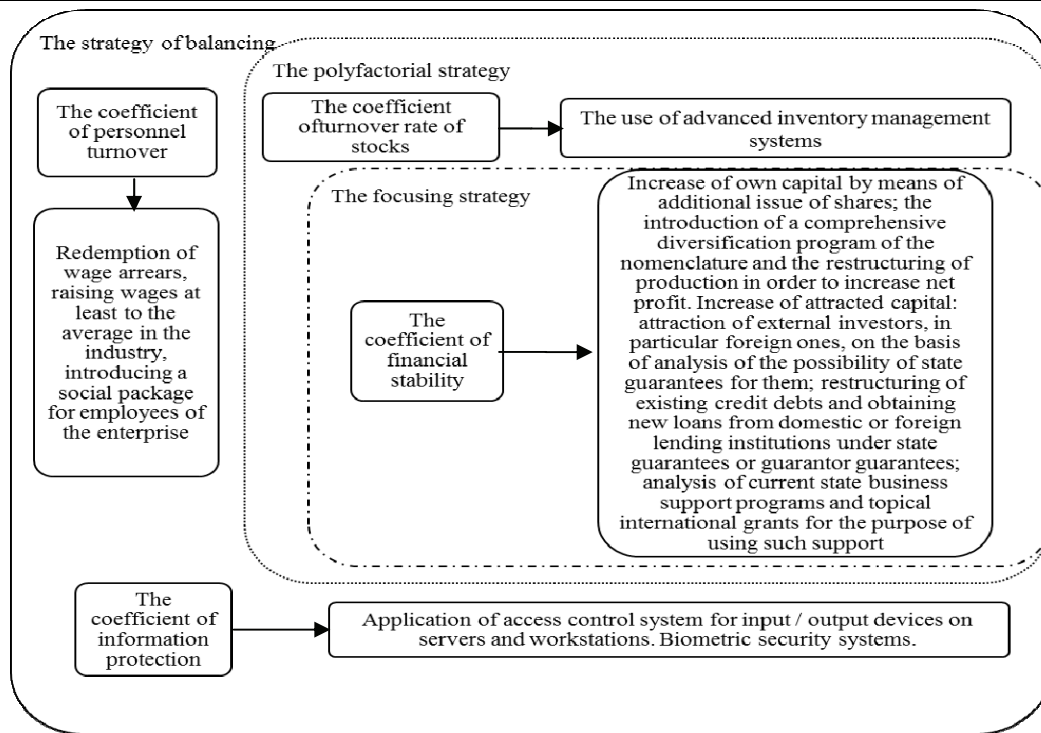


Fig. 1. Recommendation measures using selected investment strategies for PJSC «L'viv's'kyi lokomotyvremontnyi zavod»

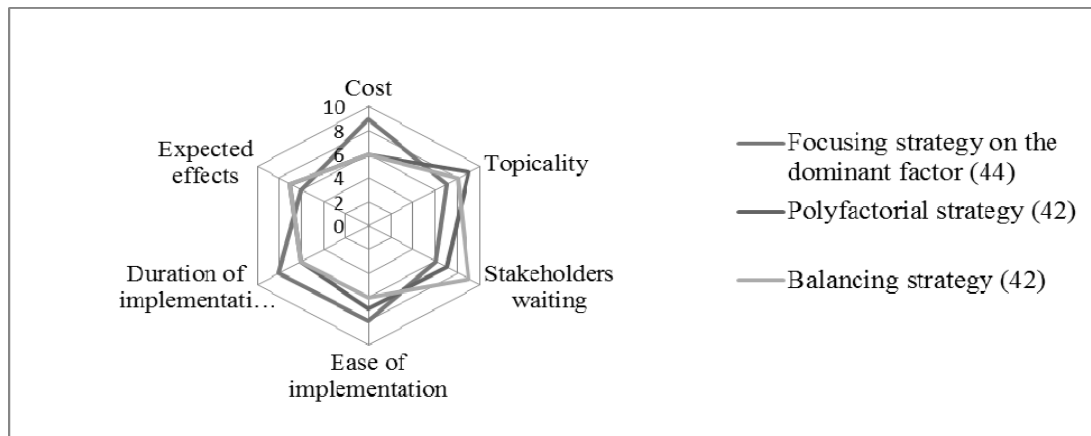


Fig. 2. Map of recommendations for choosing the optimal investment strategy for preventing bankruptcy for PJSC «L'viv's'kyi lokomotyvremontnyi zavod»

VI – providing flexibility in the risk environment (developing and adopting alternative strategies for implementation, obtaining resources, ultimately in the structure of resources):

This stage involves diversifying the risks associated with the supply of resources and their structure, that is, it is necessary to provide several versions for channeling resources, several versions for the structure of resources, for uninterrupted and efficient functioning.

VII – implementation of the selected investment strategy:

the main, most expensive and the longest stage of the process of development and implementation of the adopted investment strategy. It provides the presentation of the essence of the strategy to all employees of the enterprise, the formation or improvement of the existing management system for the implementation of the strategy, determining the responsible and their responsibility for the implementation, organization of the necessary personnel and information support.

VIII – strategic control and management of changes

of investment strategy:

in the process of implementing an investment strategy, an enterprise can face the difficulties associated with the accomplishment of tasks, as well as the need to regulate the shortcomings of the strategy itself. The system of strategic control and management of changes in investment strategy must fulfill certain tasks: identify possible deviations from previously established standards, size of deviations, their monitoring and analysis of the reasons for such deviations.

IX – assessment of social and economic efficiency of the strategy:

it is expected to compare the results of the strategy implementation with the previously set goals and the established parameters and assess the effectiveness of the investment strategy, taking into account the objectives of the stakeholders.

X – achievement and fixing of the new status quo:

final consolidation of the results of implementation of the investment strategy.

Table 1

The process of implementation and realization of the investment strategy of focusing on the dominant factor

The stage of implementation and realization of the focus strategy	Stage Duration (weeks)	Cost of the stage (EUR, €)	Performer of the stage of implementation and realization of the focus strategy
I – brainstorming to find ideas for strategic change	4	8700	Consulting company
II – formation of new goals and tasks or their rebranding	3	5100	Top management of the enterprise + Consulting company
III – analysis of factors of the internal and external environment	3	4300	Consulting company
IV - development a several versions of investment strategy	5	16200	Consulting company
V – achievement the systemic of the strategy (alignment of investment strategy with other elements of the general strategy of enterprise development)	3	5600	Top management of the enterprise
VI– providing flexibility in the risk environment (developing and adopting alternative strategies for implementation, obtaining resources, ultimately in the structure of resources)	4	12800	Top management of the enterprise
VII – implementation of the selected investment strategy	44	613650	SG Project / Mielec / PL GARANT / Lwiw / UA TimTeC Group UA / Kyiv / UA DALEX GmbH / Wissen / DE Spheros Elektron GmbH PU Wdowjak / Lwiw / UA Fronius Ukraine GmbH / UA
VIII – strategic control and management of changes of investment strategy	72	17200	Top management of the enterprise
IX – assessment of social and economic efficiency of the strategy	2	4200	Top management of the enterprise + Consulting company
X – achievement and fixing of the new status quo	4	4800	Enterprise
Total:	72	692550	

From Table 1 it can be seen that the stage of implementation of the chosen investment strategy is the most cost-effective, so let's consider it in more detail. At the implementation stage of the strategy it is envisaged introduction of a new technological line for the production of heat-exchangers, for which, according to the marketing service, there is sufficient demand and favorable dynamics of prices for such devices, as well as, according to analytical developments of the financial service of the enterprise, the profitability of production will increase, in turn, will improve the financial sustainability index (the dominant factor for this enterprise).

Figure 3 shows the cost of each of the proposed steps as a percentage of the total investment strategy focusing on the dominant factor.

Information from the above graph shows that the stage of the implementation of the investment strategy of focusing on the dominant factor is the most costly stage from the set of proposed – 613650 EUR, € or 88.61 % of the total cost of implementation and realization of this strategy.

Figure 4 shows a schedule and duration of each stage of the chosen investment strategy, since this parameter of investment strategy is extremely important for investors.

From the above tables, figures and graphs it is clear that the stage of implementation of the chosen investment strategy is the most expensive and the most prolonged, since at this stage a complex of technological, organizational, financial and economic, control and other measures, connected with the introduction of a new technological line with the production of heat exchangers, therefore, we propose to consider it in more detail in order to assess the feasibility of implementing this investment direction in the

Ukrainian enterprise in comparison with foreign countries.

In order to compare the cost of implementing the chosen investment strategy of focusing on the prevailing factor, namely the introduction of a new technological line for the production of heat exchangers, with the cost of similar projects in different countries, it is proposed to use the following formula

$$TC = \sum x_i Q_i \tag{1}$$

where TC – the total cost of realization of the project .
x – basic costs for the i-th type of resource for the implementation of a new technological line for the manufacture of heat-exchange units;

Q – the availability factor of the same type of resources for the implementation of a new technological line for the production of heat exchangers (actually affects the cost of implementing the strategy, since the less accessible or limited resource, so it is more expensive), is calculated by formula 2.

$$Q = C/C_1 \tag{2}$$

where C – cost of the resource in the analyzed country;
C₁ – cost of the resource in the base country (Ukraine).

To calculate costs, four main types of resources are selected: financial (x₁), labor (x₂), material (x₃) and information (x₄).

x₁ – costs of financial resources, namely the creation of a reserve fund for the uninterrupted financing of the process of implementation a production line for the production of heat exchangers;

x₂ – labor costs, that is, wages of workers involved in the process of realization a production line for the production of heat-exchange machines;

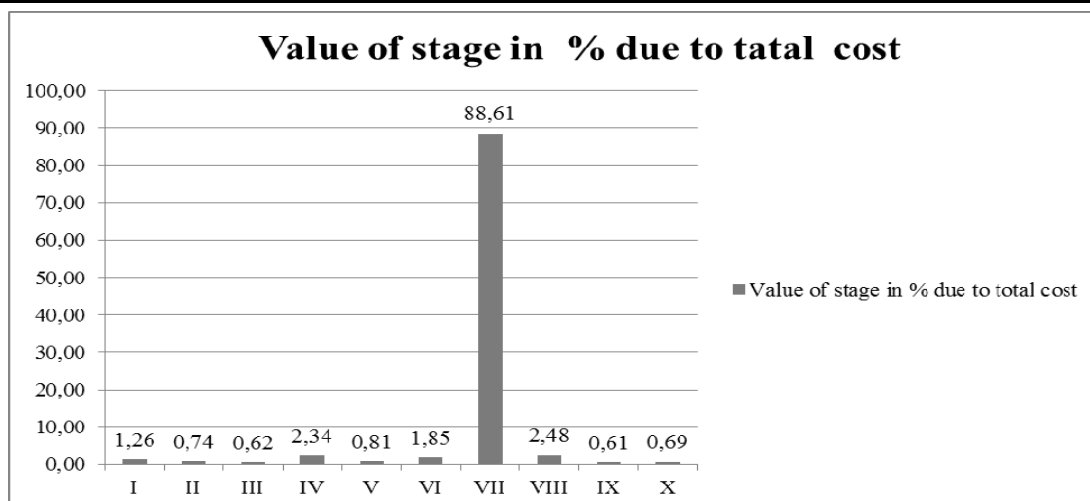


Fig. 3. Cost of the stages of implementation and realization of the investment strategy of focusing on the dominant factor

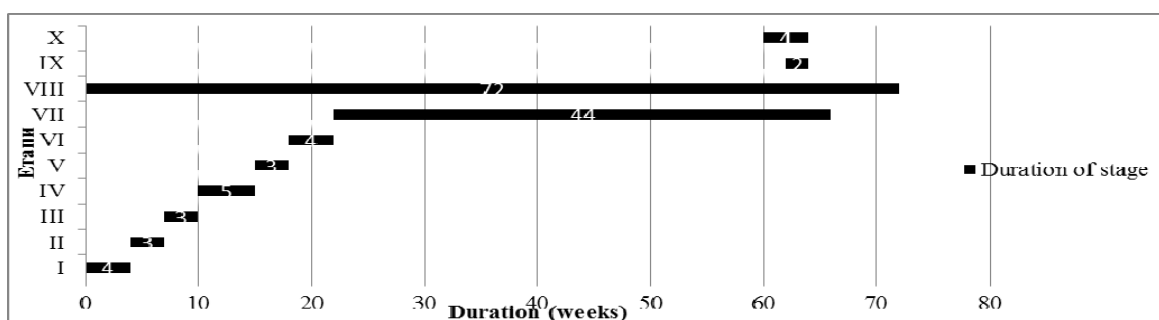


Fig. 4. The sequence and duration of the stages of implementation and realization of the investment strategy of focusing on the dominant factor

x3 – the cost of material resources, that is, the purchase of the necessary equipment and materials for the introduction of the technological line for the manufacture of heat exchangers;

x4 – the cost of information resources, namely, the cost of finding information related to the process of introducing a technological line for the manufacture of heat-exchange machines.

For resource availability coefficients, the following indicators were taken:

Q1 – the ratio of the bank discount rate in the analyzed country to the discount rate in Ukraine;

Q2 – the ratio of average monthly wages in the industry of the analyzed country to wages in Ukraine;

Q3 – the ratio of the cost of iron ore on the European market to the cost of iron ore in Ukraine;

Q4 – the ratio of the cost of providing Internet services in the analyzed country to the cost of these services in Ukraine.

Countries such as Poland, Bulgaria, Lithuania, Estonia, Moldova, Romania, Slovakia, and the Czech Republic have been selected for comparison. Ukraine is defined as the basic country.

Table 2

The cost of implementation of technological line for manufacturing heat exchangers in different countries by the end of 2017

Country	Discount rate, %	Average monthly wages in the industry, EUR	The cost of iron ore (with 62% iron content), EUR	The cost of Internet services EUR/month	Total cost, EUR
Bulgaria	0,1	486,76	61,38	25,21	632197,90
Estonia	0,1	1162,55		24,22	760902,24
Lithuania	0,1	850,80		61,73	748028,41
Moldova	6,5	285,59		9,49	596890,21
Poland	1,5	1047,48		16,87	734605,56
Romania	2,25	712,00		12,01	666704,97
Slovakia	0,1	1083,00		19,52	739707,55
Czech Republic	0,75	1139,46		25,94	760967,10
Ukraine	17	287,22		4,89	613657,00

According to the results of the calculations, the least costly stage of the implementation of the proposed investment strategy, according to the Q2 coefficient, is "the ratio of the average monthly salary in the industry of the analyzed country to the salary in Ukraine" in the Republic of Moldova, but implementation in Ukraine is only 2.8% more expensive, and by all other factors the availability of resources in Ukraine is more beneficial. Given that the political situation in Moldova is unstable, as well as the fact that according to the World Bank, in the Doing Business rating Ukraine is ahead of Moldova in terms of international trade, enforcement of contracts, protection of minority investors, it is still more expedient to comply with this project in Ukraine.

CONCLUSION

The conducted research allows to make certain conclusions as the basis for receiving in future scientific researches qualitative results of analytical developments and practical measures for forming variants of investment strategies aimed at avoiding the danger of a bankruptcy of a manufacturing enterprise, or reducing such a risk:

- assessment of the level of financial security of an enterprise should be the subject of continuous monitoring of its activities, a permanent component of the crisis management system and based on modern methods of economic and mathematical modeling;
- the practical direction of scientific results and analytical calculations should be based on actual financial, economic and organizational-production information of specific enterprises;
- evaluation of the cost of the proposed measures in the investment strategy as part of the crisis management should be conducted taking into account international experience.

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