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DIAGNOSTICS OF BANKRUPTCY THREAT TO ENTERPRISES

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Summary. The prepared diagnostics of bankruptcy threatening to the enterprises is submitted in the present thesis. Herein, bankruptcy threatening to the enterprises is being diagnosed as per three stages, i.e. the condition of the enterprise and the reasons, which have determined such condition, are being gradually concretized. The financial condition of the enterprises and the threat of bankruptcy are being evaluated at the first stage by applying the integrated model, which assists in achieving the generalized evaluation of the condition. The relative financial indices of the enterprise are being analyzed at the second stage seeking for diagnosing the problematic fields of the enterprise. The third stage, at which the absolute financial indices are being analyzed, is aimed at ascertaining the reasons, which have determined the condition of the enterprise. The size of the crisis, its activity factors are ascertained considering evaluation indices of the enterprise condition; they allow selecting substantially the bankruptcy prevention measures out of the possible leading set of internal and external measures.

Keywords: Analysis and Evaluation of the Condition of the Enterprise, Diagnostics of the Threat of Bankruptcy, Model of Integrated Evaluation, Relative Financial Indices, Absolute Financial Indices.

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1. Introduction

Business environment is becoming increasingly complicated and vague due to the growing number of various internal and external (international) factors influencing it. To reduce business risk, enterprises adapt and use more and more modern diverse management methods and techniques. However, the statistical data of Lithuania and other countries with market economy show that a large number of enterprises have become bankrupt, particularly in the time of recession. It is widely accepted that, in most cases, bankruptcy is a worse scenario for many subjects and states than making every effort to avoid it. Bankruptcy has grave consequences for society, e. g. growing unemployment, declining economy, decreasing living standard and economic development of the country.

Under the conditions of economic globalization and increasing competition in business, great attention is paid to the evaluation of the financial state of enterprises and the prediction of their bankruptcy, the analysis of its causes and their elimination. The need for measures and instruments helping to diagnose and prevent enterprise crisis and bankruptcy is constantly growing. As a result, under the conditions of market economy, the prevention of enterprise bankruptcy (anti-crisis management) has become one of the most important practical and research areas. The prevention of enterprise bankruptcy may be perceived as a number of methods and means, ranging from enterprise crisis diagnostics to the implementation of the appropriate measures aimed at overcoming the crisis (Garškienė, Garškaitė 2005). The core of bankruptcy prevention, i. e. the diagnostics of enterprise bankruptcy, determines other measures to be taken by enterprises, which have assessed their financial state and the scale of the crisis. This accounts for the fact that enterprise bankruptcy threat diagnostics is an essential part of enterprise bankruptcy prevention system.

Object of research includes enterprise bankruptcy diagnostics and bankruptcy prevention models.

Aim of the research is the development of enterprise bankruptcy threat diagnostics as an essential part of bankruptcy prevention (antichrists management), easily adaptable to rapidly changing business environment, which would allow enterprises to increase the reliability of bankruptcy prognosis and avoid the crisis or bankruptcy.

The research methods used in the paper include the analysis of scientific literature, statistical methods, grouping theory, comparative analysis and synthesis.

The problems of enterprise bankruptcy diagnostics and prevention are in the focus of many researchers worldwide (Balcaen, Ooghe 2006; Ravi K., Ravi V. 2007; Sun 2007; Sueyoshi, Goto 2009, etc.). The names of the following foreign scientists, dealing in their works with the problems associated with enterprise bankruptcy, should be mentioned: E. I. Altman, O. V. Antonov, W. H. Beavery, L. Bernstein, I. A. Blank, J. Fulmer, W. N. Grant, A. P. Kovaliov, T. Lis, G. V. Savitskaya, G. Springate, A. D. Sheremet, R. Taffler, E. A. Utkin, C. J. Van Horne, etc. In Lithuania, the problems of determining a threat of enterprise bankruptcy are investigated by J. Bivainis, S. Grigaravičius, J. Mackevičius, D. Poškaitė, C. Purlys, A. Rakštelienė, A. Sakalas, S. Silvanavičiūtė, M. Tvaronavičienė, A. Valackienė, etc.

There are plenty of works devoted to the development of enterprise bankruptcy prediction models aimed at determining the scope of bankruptcy threat, and various types of these models have been suggested (Altman 1992; Mackevičius, Silvanavičiūtė 2006; Agarwal, Taffler 2008, etc.). However, there were also many critical remarks, concerning such drawbacks of the suggested models as their limited applicability and insufficient reliability (Tvaronavičienė 2001; Grant 2003; Harrington 2003; Mackevičius 2007). Some researchers doubt about the principle of model development and the perspective of models' adaptability to ever changing business environment (Ginevičius, Čirba 2009). Another drawback of this methodology is the lack of systematic and complex evaluation of the financial state of enterprises, as well as fragmentariness of the suggestions, which are not oriented to the development of a consistent system of diagnostics and prevention of enterprise bankruptcy.

Lithuanian researchers often rely on the experience of other countries, using enterprise bankruptcy prediction models suggested by foreign researchers. The evaluation of the enterprise state by the models not investigated either theoretically or practically with respect to their suitability to a particular case can hardly be considered reliable and yield practically acceptable results. In general, the analysis of the scientific literature allows us to state that the available methodological potential suffers from the essential shortcoming: the lack of comprehensive evaluation of the financial state of an enterprise (with respect to the bankruptcy threat) and the adequacy of models under rapidly changing business and environmental conditions. This explains the existence of the gap between the practical needs and the available methodological potential. Therefore, the problem of diagnostics and prevention of bankruptcy of Lithuania enterprises is still acute. In the context of current challenges, it requires new approaches to its solution by researchers and practitioners.

2. The Results Empirical Studies of Enterprise Bankruptcy Threat Assessment

In this Chapter, the main result obtained in the empirical research carried out by the author is presented. This is a model of integrated evaluation suggested for predicting the enterprise bankruptcy threat. A prototype of the model is developed and the algorithm for its adapting to a particular application is presented. The solution is based on the conclusion made in studying the methodological potential described in the literature, its use for identifying enterprise bankruptcy threat and the evaluation of the results obtained. It is concluded that practical application of the considered models is possible only if they take into account the specific character of particular sectors of economy, and the quantitative parameters of these models are permanently actualized on the principle of the sliding retrospective data updating.

To develop a model of integrated evaluation, twelve most suitable and informative relative financial criteria, describing the state of enterprises with respect to the bankruptcy threat, were chosen out of five groups of criteria, reflecting various financial aspects of the enterprise state (e.g. profitability, effectiveness of performance, financial stability, liquidity and others). In selecting the financial criteria, two methods were used: pairwise correlation analysis and comparative analysis (based on the results obtained). The criteria

were selected, taking into account:
- the obtained quantitative parameters of stochastic relationship;
- the results of comparative analysis;
- similarity (overlapping) of the criteria (with respect to the aspect described);
- the determined structural features of the bankruptcy prediction models used.

In the set of the criteria obtained, each group is represented by 1-3 criteria. Therefore, it was concluded that an integrated evaluation model of this type could have some duplicating criteria (with respect to the features they describe). This may be considered to be a surplus or a certain reserve for increasing model effectiveness. In further empirical investigation, two most important financial criteria were selected out of each group, based on the results obtained from pairwise and polynomial correlation regression analysis. The model (prototype) of integrated evaluation was developed, making the assumptions based on the results of the methodological potential analysis (Garškaitė 2008). They are as follows:
- bankruptcy threat is a stochastic dependence on relative financial indicators of an enterprise;
- linear polynomial regression is the best form of describing the considered dependence;
- independent variables are relative financial indicators – the members of the sets of criteria, describing various aspects of the enterprise state.

A formal expression of the integrated evaluation model (prototype) based on these assumptions is as follows:

$$Y = f(X_1, X_2, X_3, X_4, X_5) + \varepsilon,$$

where Y is a bankruptcy threat; X_i denotes independent financial variables representing relative enterprise financial criteria of 5 groups according to the profile of a particular branch of economy; ε is a random component.

Given the results of the empirical research and theoretical analysis findings as well as the determined relationships between the data of enterprise bankruptcy threat evaluation and solutions (Table 1), it is possible to correlate the enterprise bankruptcy threat determined by the integrated evaluation model with a particular crisis stage and thereby with certain bankruptcy prevention measures (pursuing different aims). This radically changes the applicability of the suggested model for practical purposes, compared to similar models of enterprise bankruptcy prediction based on the principle of synthesis.

Table 1. The relations between the results of enterprise bankruptcy threat evaluation

Group of enterprises	Enterprise bankruptcy threat (Y value)	Stage of enterprise crisis	Measures and procedures (their orientation)
1	more than Y_o – very small	Not critical, or the signs of crisis cannot be observed	None, or internal procedures aimed at maintaining enterprise financial balance
2	from Y_m to Y_n – small	Shallow crisis	Internal measures aimed at enterprise restructuring
3	from Y_k to Y_l – large	Deep crisis	Internal and external measures (restructurization or bankruptcy procedures)
4	Up to Y_j – very large	Financial failure	External measures (bankruptcy of an enterprise or its liquidation procedure)

Source: made by author

The following algorithm is suggested for adapting the developed model of integrated evaluation to specific applications:
1) the retrospective data for evaluating the state of enterprises of the considered economic sector are collected, enterprises are divided into groups and the relative estimates are provided to enterprises;
2) the strength of the correlation between the enterprise state and each of the selected 12 relative financial criteria is determined by applying pairwise correlation analysis;
3) the most important financial criteria are selected from each group of criteria based on the correlation coefficients;

a discriminant analysis is performed, the analytical equation is obtained and the integrated evaluation model adapted to enterprises of a particular profile is analysed, based on retrospective data on the selected financial criteria.

3. The Stages of Enterprise Bankruptcy Threat Diagnostics

In this Chapter, the developed consistent complex diagnostics of enterprise bankruptcy threat, based on innovative principles and consisting of three different analysis components, is considered. Each component is actually a diagnostics stage of evaluating the enterprise financial state and bankruptcy threat according to the principle – from the most general (integrated estimate) to concrete evaluation (of the problem areas and causes of the diagnosed state) (Figure 1).

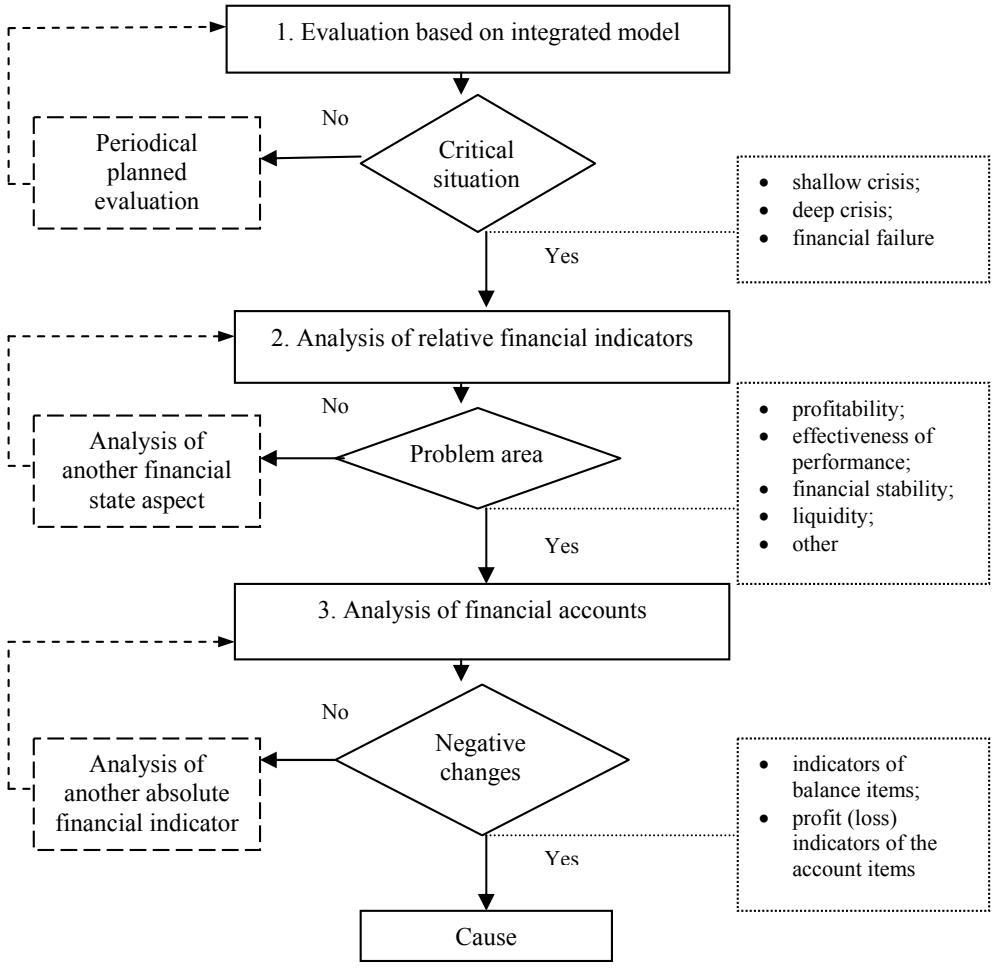

Fig.1. A basic diagram of enterprise bankruptcy threat diagnostics

Source: made by author

Each stage includes a particular analysis and evaluation of the financial state of an enterprise, performed using exhaustive and reliable enterprise accounts, as well as various data and specific methods. The actions taken at each stage are defined and the relations between the stages are determined. In each particular case, the types of the relationships and their essential features are determined, taking into account the results obtained in the analysis of the previous stage.

It is suggested that the integrated evaluation model allowing us to obtain a general estimate of an enterprise state with respect to bankruptcy threat should be used at the first stage. Applying this model to enterprise state assessment, a real bankruptcy threat may be calculated. More exactly, one of the four possible situations may be determined based on the estimates obtained (they are expressed in conditional terms, such as 'no crisis signs', shallow crisis, deep crisis, financial collapse). The state identified determines the actions to be taken. When there are no signs of crisis, the diagnostics is discontinued to be performed later according to schedule. In three other cases (when crisis signs have been observed), the causes of the identified situation should be found. Therefore, the analy-

sis is continued at the second stage and the orientation of bankruptcy prevention measures is determined (see Chapter 2, Table) for each critical situation according to the results obtained.

At the second stage, the analysis of relative financial indicators (criteria), belonging to various groups and reflecting various aspects of enterprise financial state (e.g. profitability, efficiency of performance, financial stability, liquidity and others), should be performed. This analysis is aimed at determining the main problem areas (it should be noted that the inclusion of criteria in a particular group depends on the results obtained in the empirical research). The values of the financial criteria obtained in the analysis are compared with the specified criterion values as well as with the appropriate norms and other specified parameters (Mackevičius, Poškaitė 1998; Bernstein 2000; Савицкая 2003; Шеремет, Негашев 2003; Антонова 2004; Brigham, Daves 2004; Buškevičiūtė, Mačerinskienė 2004; Mackevičius 2007). Based on the relationship between the values of the criteria and limiting values, the state of an enterprise is determined, taking into account every aspect (it may be assessed as very good, good, satisfactory, unsatisfactory and bad). When the problem area or areas are defined, the search field gets narrower, and the diagnostics of enterprise bankruptcy threat passes on to the third stage.

At the third stage, it is recommended to perform the analysis of absolute financial criteria, oriented to the examination of the potential problem areas with the aim of identifying the main causes of the critical enterprise state. The constituent parts (components) of relative financial criteria of the identified problem area (areas), i. e. absolute financial criteria, are analysed. In the analysis of absolute criteria, i. e. the respective data found in the balance sheet and profit (loss) account items, and their variations are determined (Buškevičiūtė, Mačerinskienė 2004; Mackevičius 2007, 2009). Negative changes indicate the causes of the critical states of an enterprise. In examining the criteria of the financial accounting and the character of the criterion variation, the field of analysis is being gradually narrowed and the particular causes of the critical state of an enterprise are becoming clear. This analysis makes the last stage of enterprise bankruptcy threat diagnostics. It substantiates and supplements the enterprise state evaluation results obtained at the earlier stages.

The performed comprehensive diagnostics of the enterprise bankruptcy threat provides the exhaustive information about the financial state of enterprises, the scale of the bankruptcy threat, the problem areas and causes of the enterprise critical financial state. The latter determine the types and aims of measures, recommended for preventing enterprise bankruptcy. The suggested diagnostics increases the reliability of enterprise state evaluation and bankruptcy prediction. It can be adapted to rapidly changing business environment and the specific conditions of enterprise performance in a particular branch of economy.

4. Conclusions

1. Taking into account the existing gap between the practical needs and the available methodological potential, a complex enterprise bankruptcy threat diagnostics based on new approaches, which is adapted to rapidly changing business conditions and is applicable to the enterprises of various profiles (belonging to various economic sectors), is developed. It also allows for increasing the reliability of enterprise state evaluation and bankruptcy prediction. The suggested diagnostics system consists of three different but interrelated components. Each component represents a diagnostics stage, when the enterprise state is evaluated according to the principle: the analysis proceeds from a general (integrated) estimate to concrete evaluation (of the problem areas and causes of the diagnosed state). In each case of the system's application, the types and specific features of the relationships between the diagnostics stages are defined, taking into account the results obtained at an earlier stage. This kind of diagnostics allows us to get comprehensive information about the enterprise bankruptcy threat, as well as the factors contributing to critical state development and its causes and to correlate the scale of bankruptcy threat with the recommended approximate internal and external measures of enterprise bankruptcy prevention.

2. At the first stage of enterprise bankruptcy threat diagnostics, aimed at determining the threatening danger, the application of the integrated evaluation model is recommended. The prototype of this model is created and the algorithm for its adaptation to a particular application is developed. The solution is based on the conclusion made in the research that the applicability of the considered models may be ensured only by their ability to assess enterprises of different profiles (i. e. enterprises belonging to various economic sectors) and by permanent actualization

of quantitative model parameters on the principle of the sliding retrospective data updating.

3. At the second stage of enterprise bankruptcy threat diagnostics, the analysis of the relative financial criteria of five groups (i.e. profitability, efficiency of performance, financial stability, liquidity and others) is recommended for determining problem enterprise state areas. The selection of the criteria to be included in a set is determined by the results of the empirical research. The criteria adequately reflecting the enterprise bankruptcy threat were chosen, taking into account the strength of the stochastic relation between the bankruptcy threat and relative financial criteria, as well as relative values of the relation strength, conceptual differences of the criteria (required for expanding the scope of evaluation) and the rate of using the particular criteria in enterprise bankruptcy threat prediction models.

4. At the third stage of enterprise bankruptcy threat diagnostics, it is recommended to perform the analysis of absolute financial criteria, aimed at determining the main causes of the critical enterprise state, with the emphasis placed on the examination of the problem areas. Vertical and horizontal analyses are made, narrowing the field of analysis and revealing the factors influencing the situation and causes of the critical state of an enterprise.

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