INSOLVENCY OF AN ENTERPRISE AND METHODS OF FINANCIAL ANALYSIS FOR PREDICTING IT

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Abstract*. The purpose of this article is to draw attention to the topical problem of entity-level insolvency and the insolvency prediction models. Definitions, symptoms, causes and factors affecting insolvency, suggested by various authors, are reviewed. The impact of enterprise insolvency on a country's economic growth is weighed up. Finally, the article presents the authors' research work in the field of testing various enterprise insolvency forecast models and a system of insolvency prediction methods. Recommendations of possible solutions, based on the conclusion drawn from the research, are put forward.*

Key words*: insolvency, bankruptcy, cause of insolvency, factor, forecasting model*

Introduction

Since Latvia became a EU member state, its business environment and the related factors changed substantially. One of the preconditions for a successful entrepreneurial activity is the solvency of an enterprise and the availability of financial resources. The problems of insolvency and bankruptcy forecast were investigated by many renown scientists: A.E. Altman, L.A. Bernstein, J.J. Wild (USA), R.Taffler, H. Tichow (UK), D.A. Botheras, J.G. Fulmer, G.L.V. Springate (Canada), M. Godler and J. Konan (France), J. Mackevicius (Lithuania). These scientists developed models and bankruptcy forecast methods, mostly on the basis of information drawn from financial reports prepared in accordance with national regulations and accounting standards, therefore a direct application of these methods in the analysis of financial reports of Latvian enterprises should be done with caution.

The aim of the work was is to weigh up data of various authors on qualitative indicators and models of insolvency forecast and, based on our own research results, to give recommendations for dealing with insolvency problems.

The tasks to be dealt with to reach the goal were to describe the essence of insolvency and assess its effect on a country's economic development, to investigate the views of

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various authors on more typical causes of insolvency and factors influencing it, to generalise the results of testing bankruptcy prediction models and, based on the conclusions, give recommendations regarding the resolution of insolvency problems. The ***methods*** used by authors are widely accepted quantitative and qualitative methods of economics, including grouping, comparative analysis and synthesis, graphical mapping, statistical methods. The research **methodology** is based on Latvian and foreign scientists' papers, laws and regulations concerning insolvency recognition and procedures, materials of scientific conferences and seminars as well as the authors' practical research results.

Enterprise insolvency and its influence on country's economic development

When describing the financial situation in an enterprise in connection with insolvency, authors make use of several terms in various interpretations. Weston and Van Horne connect the concepts of insolvency and bankruptcy with financial difficulties and, depending on causes, have proposed the following classification (Weston, 1992; Van Horne, 1982):

- economic failure,
- business failure,
- technical insolvency,
- insolvency in bankruptcy,
- legal bankruptcy.

A more detailed explanation and description of the nature of company insolvency was given by E. Altman who, assessing the financial situation, uses the terms of financial distress and insolvency. In Altman's interpretation, financial distress means a situation when cash flow is insufficient to cover short-term liabilities. Short-term liabilities encompass debts to suppliers and employees, lost or potentially lost court litigations, overdue loan or interest payments. The technical non-fulfilment of liabilities is a warning that the threat of bankruptcy is inevitable. Sometimes the terms "insolvency" and "financial distress" are used as identical. Insolvency is interpreted as pertaining to capital or cash flow, and both terms are often mixed up. In Webster's New World Dictionary, insolvency is first of all defined as inability to pay all debts and only secondly as the inability to pay debts in time. Insolvency in connection with capital is defined as an enterprise's negative capital when its total assets are less than total liabilities. However, there are instances when an enterprise with a negative capital reaches agreement with creditors and after a year pays the debts in full and successfully continues its business activity. If insolvency is defined in connection with cash flow, it means inability to settle current liabilities. In this case, creditors may require enterprise restructuring because the borrower does not fulfil the loan agreement. Creditors lose less in the situation when the enterprise has the negative capital, but the cash flow covers current liabilities.

This means that loan agreements will be timely fulfilled. In this situation, shareholders have to attempt to ensure that liabilities are paid for, otherwise creditors can claim part of capital. It is unlikely that the value of the enterprise will drastically decrease to the benefit of shareholders (Altman, 1999).

There are two similar terms used in economic literature – *failure* and *distress*. It is necessary to clarify what is meant by these terms.

Professor R. Morris, upon analyzing various authors' scientific publications, has concluded that the terms in question are used in the following situations:

- decrease of the real profit in comparison with the forecasted one;
- liquidation of a company;
- failure of a joint-stock company includes the term *bankruptcy*, which in reality is understood as the liquidation of a debtor or an appointment of office of the court (Morris, 1997).

Although there is no precise definition for the term *failure* in economic literature, the research performed by K. Mellahi and A. Wilkinson shows that scientists interpret this term differently; however, in the point of fact, it is done with an identical understanding. For instance, K. Cameron defines it as inability to adapt to the microenvironment, and it is connected with a decrease of funds of a company. As a result, the company loses its market share and falls out of circulation. R. D. Aveni relates financial difficulties to the losses from economic activities, K. Harrigan — to a decrease of market share, P. Jackson – to the falling out of the international market (Mellahi, Wilkinson, 2004).

When dealing with the concepts *insolvency* and *bankruptcy* of companies from the legal point of view, one has to analyze the legislation that regulates the insolvency and bankruptcy procedure in a particular country (Table 1).

TABLE 1. **Comparison of enterprise bankruptcy procedure regulations**

Country	Laws	Most important symptoms of insolvency	Procedure for enterprise liquidation
1.	2.	3.	4.
Sweden, Belgium, Norway France Denmark Lithuania U.S.A.	Bankruptcy Act Bankruptcy Law Act of Bankruptcy Enterprise Bankruptcy Law Bankruptcy Code	Debtor is unable to cover liabilities	Insolvency procedure
Canada	Bankruptcy and Insolvency Act	Debtor is unable to cover liabilities	Bankruptcy procedure
Germany United Kingdom	Law on Insolvency The Insolvency Act	Debtor is unable to cover liabilities	Bankruptcy procedure
Latvia	Insolvency Law	Debtor is unable to cover liabilities	Bankruptcy procedure

Source: Rajak (1995), LR Insolvency Law, accessible: *www.mna.gov.lv* (March 3, 2008).

In western countries, usually it is the bankruptcy law that regulates insolvency processes. If an enterprise experiences financial difficulties and is unable to meet its liabilities, then (in accordance with the country's legislation) bankruptcy notice is submitted, and the enterprise's liquidation follows in compliance with the insolvency procedure. In this context, works of the western scientists P. Fitzpatrick, J. Horrigan, C. Merwin, V. Beaver, E. Altman et al. on financial difficulties and related problems concern bankruptcy forecast.

Since the beginning of 2008, in Latvia insolvency and bankruptcy procedures are regulated by Insolvency Law which replaced the Law on Insolvency of Commercial Associations and Business Companies, adopted in September 12, 1996. The law applies to merchants, legal persons (except for ***entirety of property of an estate*****) or natural persons** (further **insolvency subjects**) **who are unable to meet their liabilities and show symptoms of insolvency.** In this law, the term 'bankruptcy' was defined as a resolution of the state of the insolvency process which comprises a whole set of financial, legal and organisational measures aimed at a feasibly full satisfaction of creditor claims and liquidation of the debtor.

At the same time, '**insolvency**" was defined as a state of an insolvency subject established by court decision in a legal protection procedure or insolvency procedure. The new Insolvency Law provides also for the situation when a business association's solvency is limited. Limited solvency means a state when in a short term a business association lacks money to meet its mature liabilities or the liabilities that will mature soon.

Assessing the substance of insolvency in economic and legal aspects, one can conclude that to describe an enterprise's financial difficulties and failures, the terms *enterprise insolvency* or *bankruptcy* are used. Analysis of economic and scientific literature shows that scientists equalise these two concepts. Also, the models for bankruptcy prediction (created by various scientists) in fact forecast the likelihood of insolvency. As a result, the authors arrive to the conclusion that the concepts *insolvency* and *bankruptcy* can be used as identical terms because they both describe the situation when a company cannot meet its financial liabilities and continue its economical activities.

To assess the influence of insolvency on the country's economic development, it is worthwhile to analyse various statistical data.

Statistical data (Fig. 1) show that since 1999 the number of insolvent companies in Latvia was growing from 616 in 1999 to 1586 in 2003. Only after 2004 we can observe some decrease, and a significant decrease was observed in 2005 and 2006 when only 771 and 886 companies, respectively, declared their insolvency. The number of insolvent companies is growing up after 2005 again. Experts of Insolvency Administration explain the reduction of insolvency cases by the following reasons:

- the entrepreneurs have learned how to plan their actions and expenses. This is a proof of a certain development of the entrepreneurial environment as well as improving the general welfare in Latvia (Ramiņa, 2006);

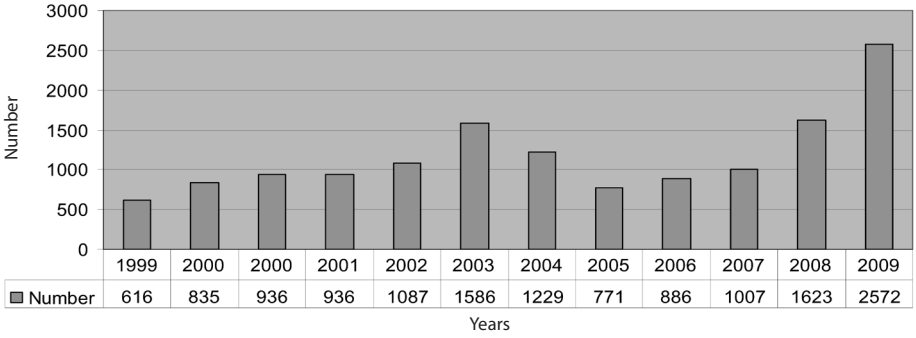

FIG.1. **The number of insolvency cases in Latvia, 1999–2009**

Source: Lursoft statistic, accessible: www.lursoft/statistika (January, 2010).

- creditors are denied the possibility to participate in the selection of administrator of an insolvent enterprise (Lūsis, 2006);
- several legal acts were enacted (Brūvelis, 2006).

It should be emphasised that these expert opinions are very sketchy because no investigation has been carried out on the reasons for an increase or decrease of the number of insolvent enterprises and its impact on economic development. When investigating the requirements of legal acts regulating entrepreneurship, the authors arrived to the conclusion that the major reason for the reduction of the number of insolvency cases was the inaction of the requirement of the Commercial Law that enterprise re-registration had to be done till December 31, 2004. An enterprise with financial difficulties was unable to be re-registered and was liquidated without insolvency process. This was confirmed also by data of *Lursoft ltd*: in 2005, the Enterprise Register adopted the decision to stop the activities of 7663 enterprises (3.8% of all enterprises registered in the enterprise register) pursuant to the enacted first and second parts of Clause 19 of Commercial Law.

TABLE 2. **The outcome of bankruptcy proceedings of Latvian enterprises, 1991–2009**

Procedures	Number	Structure,%
Completion of bankruptcy procedure and termination of insolvency process	10560	88.8
Rejected bankruptcy notification	942	7.9
Insolvency proceedings terminated in court	143	1.2
Opened and completed procedure of bankruptcy	113	1.1
The debtor covered all liabilities	65	0.6
Till the end of the announced term no creditors have registered	16	0.1
The debtor paid for all mature liabilities and its assets exceeds the total remaining liabilities	31	0.2
Sanitation process completed	17	0.1
Total	11887	100

Source: Lursoft statistic, accessible: www.lursoft/statistika (January 2010).

Statistical information (Table 2) shows that in Latvia the major part (88,8%) of insolvent enterprises discontinue economic activity and are liquidated. In accordance with the laws, bankruptcy constitutes resolution of insolvency condition, and it is expressed as the liquidation of a debtor and meeting the creditors' claims from the funds gained in the process of liquidation by forfeiting the debtor's property. There are very few enterprises able to recover their financial situation and continue economic activities after insolvency notification. Only 17 enterprises managed to improve their financial situation through sanative measures, and 31 were able to settle all areas and their assets exceeded the remaining debt.

Bankruptcy means lost jobs. State responsibility is to protect citizens socially and economically so that they do not become redundant. To the purpose, there is money allocated in a special budget.

TABLE 3. **Quantitative analysis of unemployment support payments, 2001–2006**

Items	2001	2002	2003	2004	2005	2006	2007*	2008*	2009*
Expenses, mill. Ls	18,4	21,1	23,7	27,1	28,9	32,8	43,3	56,5	137,2
Number of unemployment benefit receivers (thousands, monthly average)	37,9	41,5	38,9	39,7	37,9	34,7	33,8	31,9	67,0

Source: LR Welfare Ministry, accessible: www.lm.gov.lv/ soc_zin0405.PDF(February 2008).

* Data from Social Agency, accessible: www.vsaa.lv/vsaa/reports (January 2010).

The statistical information from Welfare Ministry and Social Agency attests that the unemployment benefits amount to millions of Lats, and since 2001 a trend of increase is observed – from Ls 18,4 mill. to Ls 137,2 mill. in 2009 (Table 3). When considering state policy in ensuring citizens' welfare, an increase of these indicators may deem a positive tendency. However, one has to admit that this money would produce a bigger contribution to welfare if redirected to the development of the economy.

To a large extent the country's economic development depends on taxes which constitute the basic budget income. When enterprises become insolvent and go bankrupt, the state loses considerable amounts of income (lost tax income). This is confirmed by the VID (State Revenue Service) statistical information. In 2004, the VID wrote off the tax debt of Ls 135,55 mill. because 1100 enterprises were declared bankrupt.

Tax debts of insolvent enterprises make up a considerable part of all tax debts, and the sums are big (Table 4), therefore the state income is less than planned and there is less money to be spent on economic development.

The actual payment term after delivery of products or services and delayed payments also affect the financial situation of an enterprise. In this area, regular investigations are carried out by the Creditinform Latvia agency.

TABLE 4. **Tax debt of insolvent Latvian enterprises, 2006–2008**

	2006		2007		2008	
Classification of the tax debt	Debt, thousand Ls	Percentage of the total tax amount, %	Debt, thousand Ls	Percentage of the total tax amount, %	Debt, thousand Ls	Percentage of the total tax amount, %
Indebted enterprises with insolvency process started	11125,39	2,63	11029,9	2,66	9994,43	1.62
Indebted enterprises declared insolvent	247121,76	58,33	227378,95	55,0	204580,67	33.24

Source: LR State Revenue Service, accessible: www.vid.gov/lv/user (January 2009).

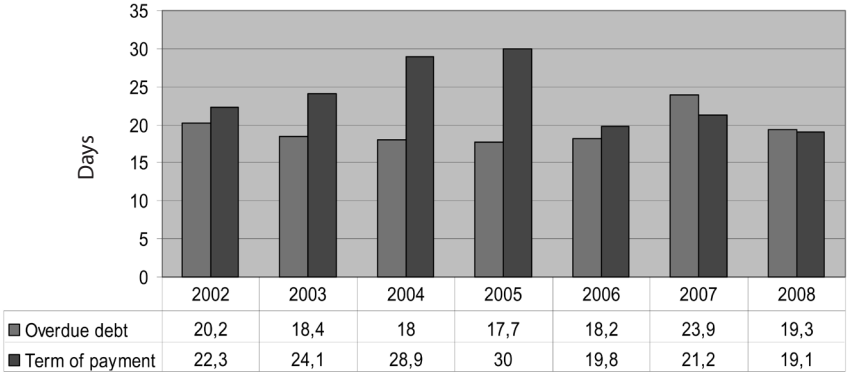

FIG. 2. **The average number of days that a payment is delayed after receipt of goods or services in Latvia, 2002–2008**

Source: Creditreform Latvia, accessible: www.creditreform.lv/an_pet/(March 2009).

Investigation by *Credit-reform Latvia* shows (Fig. 2) that credit policy and practice of tax collection in 2008 became considerably more balanced and more closely linked with marketing policy. The term of payment laid down in contracts for commodity and services provision considerably reduced. This is the lowest index since 2002, when the due date was determined as an average of 22.3 days. However, the week point of the chain remains the timely settlement of payment. In general, the payment discipline has considerably deteriorated in comparison with the previous year. The analysis indicates that 2.8% of invoices were not paid at all, and only 58.8% of all invoices were paid in compliance with contract terms. In 2005, these indicators were better – 1.7% and 63%. Attention is drawn to the fact that the number of delayed payments increased particularly

rapidly (more than twice) in the time period of 31 to 60 days. Such payment delays comprised 12.1% while in 2005 only 5.6%. The above facts suggest that the growth tendency of the percentage of delayed payments becomes rather salient and approaches the critical solvency risk margin. Polling of merchants testifies that one of the causes for such a situation is the delayed, unsystematic and incomplete procedure of debt collection, inability to properly monitor client payments.

Generalising the results of investigations of how insolvency affects economic growth, the authors conclude that enterprise insolvency is a serious problem. Discontinuation of economic activity and application of bankruptcy procedure negatively affects the socio-economic development of the state. Investors and creditors lose their investments; tax debts reduce the state revenue and consequently unemployment benefits; these are the assets that are lost for enhancing the economic growth.

Causes and factors influencing enterprise insolvency

Insolvency is linked to enterprise financial difficulties, and an enterprise can go bankrupt if the causes and factors influencing insolvency are not timely understood. One of the trends of financial analysis regarding the analysis of insolvency problems is the study of qualitative indicators. According to the interpretations presented in various publications, these studies can be divided into two groups:

- analysis of insolvency indications and reasons;
- internal and external factors influencing solvency.

There may be various causes of insolvency, such as the adverse impact of economic factors, financial difficulties, lack of professionalism, neglect, natural disasters, fraud, etc. Getting timely aware of these causes allows taking preventive measures to amend the situation.

R. Morris has investigated the symptoms and causes of insolvency and concluded that there are several qualitative and quantitative indicators that provide an insight into an enterprise even before a detailed analysis of financial indicators is done.

The major indicators that deserve attention are:

- age of enterprise;
- level of diversification;
- changes in business areas;
- change of enterprise name;
- growth rates of assets;
- long-term financial investments;
- liquidation of subsidiaries and reduction of the number of employees;
- dividend policy;
- the number of years when dividends were not declared;
- the number of years when the enterprise suffered losses;
- the number of years when the net turnover showed no increase.

In case of small companies, usually the most characteristic problems are a decrease of growth rate, a low level of diversification, a decrease of long-term financial investments and unsuccessful economic performance during the last two years. These factors adversely affect the financial situation of an enterprise. The change of business activities, developing business in some other sector indicates the company owner's and managers' flexibility and their ability to react timely and prevent the possible problems of insolvency (Morris, 1997: 227–228).

S. Slatter has carried out a similar investigation. He has analysed enterprise annual reports and made the conclusion that most characteristic symptoms and causes of enterprise financial difficulties are:

- decrease of profitability;
- decrease of sales at constant prises;
- increase of loans;
- reduction of liquidity;
- reduced dividend payments;
- reduction of market share;
- change of accounting and asset evaluation methods;
- change of auditors;
- delayed publication of annual reports;
- frequent change of department managers (Morris, 1997: 188–189).

For the external users of financial reports, indications established by S. Slatter are easily applicable and advisable for assessing the overall situation of an enterprise.

From investigations of Latvian scientists in the field of insolvency causes, worth noting is the research on enterprise management in insolvency process by A. Klauss. His study shows that the primary causes of insolvency of Latvian enterprises are the following:

- insufficient competence of the CEO;
- unstable and / or insufficient market access;
- strong (supported by foreign capital) competitors entering the market;
- tax and duties policy;
- high extra charges for even unintended tax law infringements;
- dishonesty of business partners and competitors (Klauss, 2004).

It should be stressed that his research was done before Latvia accessed the EU, therefore the authors of the present paper carried out a similar research – they analysed and weighed up the entrepreneurial environment after EU accession.

When summarizing the respondents' replies, the authors found that 70% of entrepreneurs indicated the following factors affecting solvency:

- insufficient information concerning the EU regulations and directives;
- unclear customs procedures;

- customs tariff application to export / import transactions with third countries;
- application of EU environmental requirements to production processes;
- declaration of surplus of agricultural products;
- heavy tax burden.

The factors indicated by Latvian entrepreneurs should be essentially associated with the common factors of state socio-economic development.

Alongside the factors like insufficient information on EU regulations and directives, unclear customs procedures, customs tariff application to export / import transactions with third countries, there is also the responsibility of state authorities. The averting impact of factors such as application of EU environmental requirements to manufacturing processes, declaration of surplus of agricultural products, heavy tax burden depends on the flexibility of governmental authorities in the process of the gradual implementation of the EU requirements

Upon analysing data published by several researchers, the authors of this paper have concluded that the most important groups of causes affecting solvency are:

- imperfections and shortcomings in enterprise management;
- adverse impact of economic factors;
- problems of credit and investment accessibility;
- debt accumulation and unfulfilled obligations.

Insolvency forecast methods

One of the preconditions for a successful entrepreneurial activity is the solvency of an enterprise and availability of financial resources. Decision making on capital deployment is based also on financial analysis methods which are used by specialists of many professions – accountants, economists, auditors, financial managers and analysts, i.e. essentially by experts involved in preparing financial reports and managerial decision making in enterprises and banks, or who check the credibility of financial reports, business plans and consult the potential investors. Before making investment, the potential partners and investors have to estimate both the enterprise's current financial situation and tendencies of its economic activity development.

The financial situation of an enterprise is an economic category which describes the capital turnover process in an economic entity, its development capability without attracting external capital. In the course of economic activity, capital is in continuous movement; the structure, amount, sources of and the necessity for finances are changing and so is the financial situation. As a result, the solvency of the enterprise either improves or deteriorates. The financial situation of an enterprise may be either stable or unstable. An enterprise is considered financially stable if it is able to cover timely its liabilities and pay the bills, to finance enterprise activities by income from the basic economic activities and avoid situations of financial crises (Savicka, 1999: 606). Concurrently with the

development of entrepreneurship develops also the branch of economic analysis – analysis of financial coefficients, the purpose of which is to assess the enterprise's financial situation and to forecast insolvency.

When analysing and comparing views of several scientists, the authors of this paper have concluded that the range of financial coefficients (which are recommended for insolvency prediction) is very wide. However, calculating financial coefficients and investigating their changes by means of data comparative analysis do not provide a precise estimate of solvency and the level of bankruptcy probability. Along with the economic development, methods of financial analysis were improved, and researchers focused on the development of bankruptcy forecast models based on various combinations of financial coefficients. Latvian economic literature and textbooks published after Latvia regained independence contain little material on financial analysis and its methods. Even less attention was paid to such specific (though very important) methods of financial analysis as insolvency and bankruptcy forecast. There is very little scientific research concerning the applicability of these methods to the analysis of financial reports of Latvian enterprises.

We included in our research the bankruptcy prediction models that were developed using a linear function – multiple discriminant analysis by which the forecasting index is calculated for determining the bankruptcy probability level.

From quite a wide range of bankruptcy forecasting models described in the literature, we used in our empirical research the models that were developed in various economic situations and periods and for which different combinations of financial coefficients were used (Table 5). Thus, in the practical research we used E. Altman's Z`, E. Altman's Z``, G. Springate's Z, J. Fulmer's H, H. Tisshaw's Z, R. Taffler / H. Tisshaw's Z, M. Zmijewski's Z, Irkutska's R, G. Savicka's Z, R.Shorins / I.Voronova's Z_{2L} bankruptcy forecast models (Table 5).

In this practical research, we used 513 financial reports (analysed in 2002–2006) of 163 various enterprises from construction, processing industry, service industry and trade.

The choice of models was made taking into account the following principles:

- ***accessibility of financial reports***. From the database of Insolvency Administration Agency we selected only the enterprises the insolvency of which was registered in the period from 2002 to 2006 (group 1 enterprises). From each industry, we took 50 enterprises in alphabetic order, and requests for financial reports of group 1 enterprises were applied to the LR Enterprise Register. Some of the mentioned enterprises had not sent their financial reports to the Enterprise Register, thus for the practical research we used only the available reports. Financial reports of solvent (group 1) enterprises were obtained from enterprises where students had their field practice;
- ***reality of financial reports***. Data used in the research must be realistic. Therefore, when selecting the enterprises no criteria were applied, which would restrict the

TABLE 5. **Financial ratios and elements used in the bankruptcy prediction models***

Financial ratios / Year of development and authors	1973, E. Altman Z`	1973, E. Altman Z``	1976, H. Tisshaw	1977, R. Taffler / H.Tisshaw	1978, G. Springate	1984, J.Fulmer	1984, M. Zmijewski	1997, V. Šorins / I. Voronova	2001, G.Savicka	2003, Irkutskas R
Working capital / total assets	X	X			X			X		
Retained profit / total assets	X	X				X		X		
Profit before tax and interest / total assets	X	X			X					
Own capital / book value of liabilities	X	X						X		
Net turnover / total assets	X			X	X	X		X	X	X
Short-term liabilities / assets				X		X				
Quick assets / current liabilities			X							
Total liabilities / total assets						X	X			
Profit before interest and tax / liabilities			X							
Profit before tax / net turnover			X							
Current assets / (liabilities – taxes)			X							
(Cash + short-term securities) / current capital			X							
Profit before tax / short-term liabilities					X					
Net profit / assets							X		X	
Current assets / short term liabilities							X			
Working capital / current assets									X	
Current assets / assets				X					X	X
Own capital /assets									X	
Profit before tax and interest / short term liabilities				X						
Profit before tax /own capital						X				
Cash flow / liabilities						X				
Fixed assets / assets						X				
Working capital / liabilities						X				
Profit before tax and interest / interest						X				
Profit before tax / assets								X		
Net profit / own capital										X
Net profit / (cost of production + selling costs + management costs)										X

* Compiled by authors of the paper.

selection by amount of assets, net turnover or profitability. Data acquisition from places of student field practice confirms that these enterprises were not subject to insolvency process and were successfully continuing their economic activity.

The distribution of the financial reports by industries is shown in Table 6.

TABLE 6. **Overview of entities and number of financial statements included in the study**

Industry	Number of group 1 enterprises / number of reports	Number of group 2 enterprises / number of reports
Construction	18 / 53	18 / 62
Services	15 / 46	16 / 53
Production	20 / 59	26 / 89
Trade	25 / 74	25 / 77

To test the models, forecasting indexes were calculated using enterprise financial reports. To obtain a correct accuracy estimate for a particular model, the index values obtained were compared with model estimation criteria (developed by scientists). Our theoretical research confirms that in respect to forecasting models of various authors and model testing results, the accuracy of 80% is considered as good, and such model may be recommended for insolvency forecast.

TABLE 7. **Model test averaged results for group 1 enterprises***

No.	Model	Number of reports analysed	Indicated insolvency probability	
			Number	%
1.	Altman's Z`	232	169	72,8
2.	Altman's Z``	232	212	91,4
3.	Springeit's Z	232	142	61,2
4.	Fulmer's H	149	128	85,9
5.	Tišov's Z	222	70	31,5
6.	Taflers / Tišov's Z	232	53	22,8
7.	Zmijevska's Z	232	178	76,7
8.	Irkutska's R	232	19	8,2
9.	Savicka's Z	231	58	25,0
10.	Šorins / Voronova's Z_{2L}	232	174	75,0

* Compiled by authors of the paper.

The model test averaged results (Table 7) obtained for insolvent enterprises show that only two models had the accuracy above 80% (Altman's Z`` 91.4% and Fulmer's H 85.9%).

In the course of the further research, the bankruptcy forecast models were tested using financial reports of group 2 enterprises for which insolvency was not registered (they successfully continued their business activities).

Not all models tested showed a high level of credibility.

TABLE 8. **Summary of the test results for group 1 and 2 enterprises***

No	Model	Average model accuracy in the industry, %							
		Construction		Production		Services		Trade	
		gr. 1.	gr. 2.	gr. 1.	gr. 2.	gr. 1.	gr. 2.	gr. 1.	gr. 2.
1.	E. Altman's Z`		87.8	91.6	94.4	82.6	95.0		98.2
2.	E. Altman's Z``	94.3	92.7	91.6	90.3	84.7	90.0	93.2	89.3
3.	J. Fulmer's H	83.3	83.9	84.5	77.9	96.1	85.0	83.3	90.2
4.	M. Zmijewski's Z	81.1	0		0		95.0	85.2	92.9
5.	R. Shorins/I.Voronova's Z_{2L}		92.7		83.4	82.6	92.5	82.5	94.6

* Compiled by authors of the paper.

The summary of test results (Table 8) includes model test results with the credibility rating above 80%. Their reacting capability was checked using group 1 and 2 enterprise financial reports. For model estimation, the most important criterion is the test result based on group 1 enterprise financial reports, because for decision-making it is important to reinforce the forecasted bankruptcy possibility. Our results have shown that there are but a few models to demonstrate the accuracy above 80%; at the same time, there are models which are useful only for certain branches of industry. The best results in enterprise insolvency prediction may be achieved using Altman's Z`` and Fulmer's H models. To improve the forecast credibility, our suggestion is to calculate bankruptcy forecast indices using all models recognised for a particular industry.

System of insolvency prediction for Latvian enterprises

However, enterprise bankruptcy is a juridical fact, it has various causes and influencing factors the existence of which is evidenced by various insolvency symptoms. Therefore, insolvency forecasting methods are effective tools allowing to disclose the existing bankruptcy threats and characterise the financial situation of an enterprise by producing numerical and other criteria and unveiling the influencing factors in order to prevent insolvency.

Research of financial analysis methods for evaluating the financial situation of an enterprise and the threat of its insolvency shows that conditionally they can be divided into two groups:

- methods application of which require but numerical information drawn from enterprise financial report (quantitative methods);
- methods application of which require various quantitative and qualitative indicators including those drawn from enterprise financial reports (qualitative methods).

For insolvency forecast, one can use various financial coefficients and bankruptcy forecast models. Calculating individual financial coefficients does not provide a possibility to estimate bankruptcy threat level for a particular enterprise; therefore, it is better to use bankruptcy forecast models. Results of model testing during the research show that all bankruptcy forecast models included in the research are suitable for analysing the financial reports of Latvian enterprises.

The present study has revealed a number of symptoms and factors indicating that the enterprise may become insolvent. In many cases, the insolvency symptoms and influencing factors may be revealed 2–3 years before bankruptcy. Bankruptcy may be avoided, if insolvency indications and influencing factors are timely established and proper measures are taken to improve the financial situation.

Studying scientific literature on enterprise financial problems, we have arrived to a conclusion that insolvency forecast should be performed using a certain system encompassing both quantitative and qualitative indicators.

The group of quantitative indicators should encompass bankruptcy prediction indices, while the group of qualitative indicators should encompass the insolvency symptoms and external factors that affect solvency.

A system of insolvency prediction methods based on theoretical and empirical research results was compiled by the authors of the paper (Fig. 4). Into the group of quantitative indicators we included bankruptcy forecast models, whose testing showed a forecasting credibility above 80%. The insolvency symptom group was compiled by generalising data of various authors and selecting symptoms (indications) equally recognised in scientific papers of several authors and which may be established by analysing enterprise annual report information. Gathering information on insolvency symptoms is necessary for two reasons:

1. Established insolvency symptoms reinforce the threat level evaluated by the bankruptcy forecast model.
2. By gathering insolvency symptoms, the enterprise management can take timely measures to improve the situation by carrying out an in depth-analysis, clarifying the causes and influencing factors, adopting effective decisions, and thus to avoid insolvency and bankruptcy.

Into the group of external factors we included the factors recognised in papers of various authors as most important and found (by polling results) typical of the Latvian entrepreneurial environment (at the time of research). The enterprise management cannot estimate the influence of the external factors, however, they should not be ignored because their influence on enterprise business activities is no less important than that of internal factors or symptoms, preventing which is in the scope of management duties. Clarifying the external factors substantiates also the bankruptcy threat estimate.

When forecasting insolvency in compliance with the proposed system, it is advisable to apply the elements of the system in the following sequence:

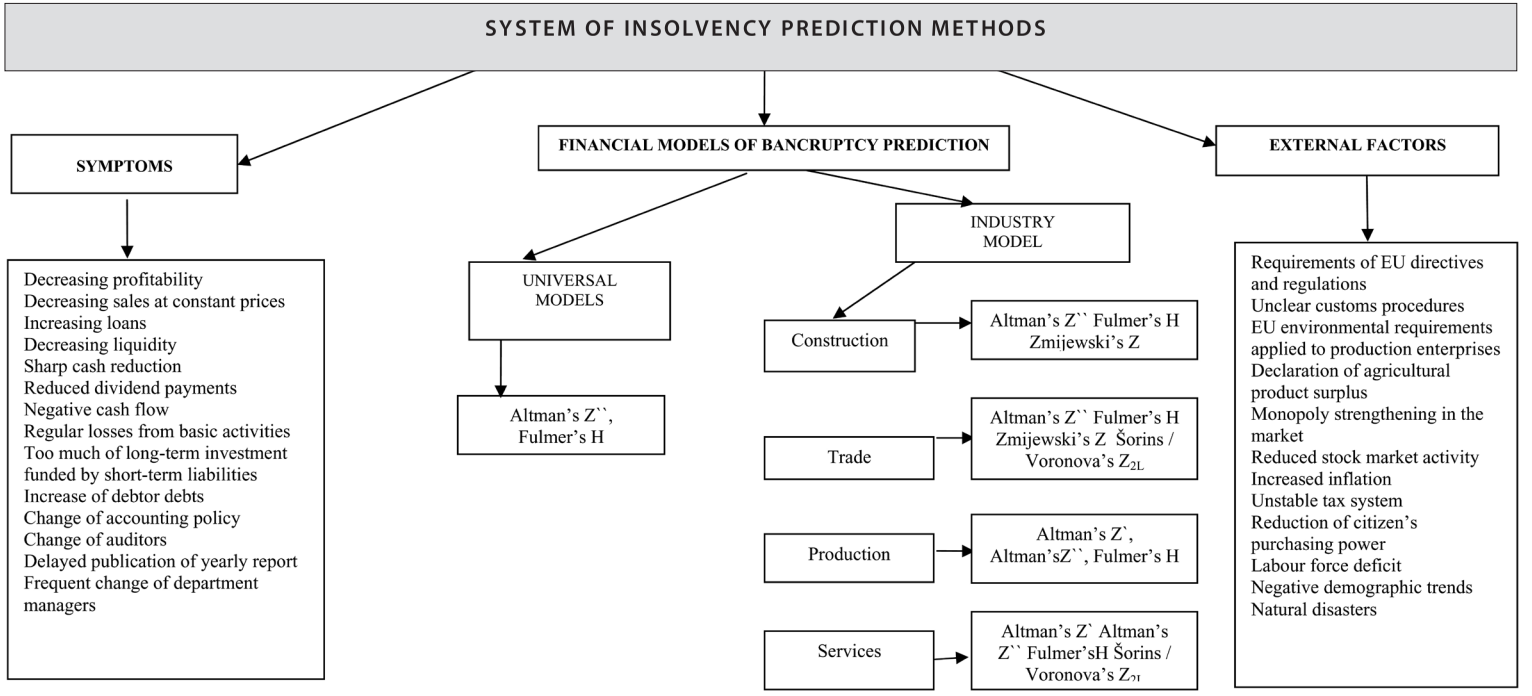

FIG. 4. **System of insolvency prediction methods for Latvian enterprises (compiled by the authors of the paper)**

1. Tocalculate the ***insolvency*** forecasting index, using the bankruptcy forecasting model which corresponds to the industry the enterprise belongs to; to obtain an estimate of the bankruptcy threat level.
2. To select ***insolvency*** symptoms using enterprise annual report data.
3. To estimate the external factors affecting the enterprise and to draw conclusions as to whether the established factors are substantial for the enterprise.

The estimates of ***insolvency*** symptoms and external factors will be subjective and depend on the analyst's knowledge and experience; therefore, it is impossible to define a certain number of symptoms and factors which would indicate the ***insolvency*** threat for an enterprise. Only the forecasting index, obtained by financial calculations, indicates a particular bankruptcy threat level, while establishing ***insolvency*** symptoms and estimating external factors lead to a more impartial evaluation of bankruptcy probability.

When applying a system of insolvency prediction methods to the analysis of an enterprise's financial reports, some conditions should be met:

1. The groups of insolvency symptoms and external factors in general are equal for all industries and so they are for individual industries.
2. The financial model for bankruptcy forecast to be applied depends on the industry the enterprise belongs to:
   - E. Altman's Z`` and J. Fulmer's H models are suitable for all industries;
   - E. Altman's Z``, J. Fulmer's H and M. Zmijewski's Z models are suitable for enterprises of construction industry;
   - E. Altman's Z``, J. Fulmer's H, M. Zmijewski's Z and R. Shorin / I. Voronova's Z_{2L} models are suitable for enterprises in the area of trade;
   - E. Altman's Z`, E. Altman's Z``, J. Fulmer's H models are suitable for enterprises of production industry;
   - E. Altman's Z`, E. Altman's Z``, J. Fulmer's H, and R. Shorins / I. Voronova's Z_{2L} models are suitable for enterprises in services industry.

Conclusions

Summing up the results, we arrive to several conclusions and recommendations.

Enterprise solvency is a serious problem. Discontinuation of the economic activities of an enterprise and application of bankruptcy procedure negatively affect the socio-economic development of the state. Investors and creditors lose their investments; tax debts reduce state revenue and consequently unemployment benefits – these are the assets that are lost for enhancing the country's economic growth.

To solve the insolvency problem, systems of qualitative indicators can be used. To avoid insolvency and bankruptcy, authors recommend to test the insolvency symptoms every year after preparation of the financial report.

The research on the development of insolvency and bankruptcy forecast models has shown that there is a great variety of such models. The models differ by the financial indicators used and the number of employed financial coefficients.

Testing of the bankruptcy forecast models has shown that Altman's Z`` and Fulmer's H models can be recommended for analysing financial reports of Latvian enterprises.

Analysts and common users of financial reports are interested in getting an insight into the financial situation of the existing or potential business partner as well as in their future development prospects. Well-founded information may be obtained by putting together the subjective assessment (after insolvency symptoms have been studied) and results of calculating bankruptcy-forecasting indices. Information obtained in this way is useful also for the enterprise owners and management to gain awareness about errors and shortcomings in the enterprise activities. When market economy and entrepreneurial activities grow, application of a scientifically well-grounded system of insolvency prediction methods will provide a possibility for users of financial reports to timely detect the enterprise's insolvency and avoid loss of investments.

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