BUSINESS SUCCESS AND FAILURE PREDICTION SOFTWARE - BEX MODEL

Meri BOSHKOSKA
University St.Kliment Ohridski – Bitola, Republic of Macedonia
meribb@yahoo.com
Milcho PRISAGJANEC
University St.Kliment Ohridski – Bitola, Republic of Macedonia
milco.prisaganec@gmail.com

Abstract
The possibility to predict bankruptcy of a company before it actually occurs has resulted in a development of a great number of research works on business failure. In theory, there are several models that could predict the financial instability of the companies. A few of these models have been expanded and applied in the developed countries the market environment of which differs from those in the developing and transition countries.
When evaluating and predicting the excellence of a company it is important to consider the economic environment in which the company has been dealing. This is we have decided to use the BEX model as it has been designed for the Croatian business environment which is similar to the Macedonian one.
The objective of this paper has been reached by developing a software analysis based on BEX model which enables calculation, determination and visual presentation of a company's excellence, as well as a business success and failure prediction.

Key words: *BEX model, financial distress, company bankruptcy, software interface.*

JEL Classification: *G33, C63*

I. INTRODUCTION

The term "financial distress" describes a temporary lack of liquidity of a company and the difficulties which arise when fulfilling the financial commitments, on time. (Outecheva, N, 2007, p.13). Outecheva also highlights that the financial distress is very often determined in terms of bankruptcy, failure and default. Financial distresses of the companies have serious harmful economic effects on the whole society and therefore they should be seriously treated (Silvanaviciute, S 2008).

A financial stable company is powerful enough to be able to sustain a temporary problem like a capital insufficiency, a sale reduction or a loss of a key customer. (Edmunds – Asche, S and Media, D, n.d.). Novak B. (2003) points out that there have been a lot of researchers who, by applying financial indicators, make predictions on the difficulties of a company in the future.

Financial models for evaluation of the financial stability of the companies have been using various combinations of financial indicators like: total assets profitability (89 models), liquidity currents ration (51 models) and liquidity quick ratio (30 models), (Jezovita, 2015). The prediction models have proved to be very helpful for managers, analysts, investors and creditors and can serve as "early warning systems for the country as a whole". (Kozjak, Sestanj, Peric, Besvir, B, 2014).

A greater number of the models for financial statement of the firms have been incorporated and implemented in the developed countries in which the functioning market mechanisms differ from those in the transition countries. The purpose of this paper is to develop a software for calculation and visual presentation of the business excellence and business success and failure prediction of the Macedonian companies. The software has been designed to use Business Excellence Model (BEX). BEX is a model made by Belak and Barac and it is used for business excellence evaluation of the Croatian companies with the support of financial indicators which are available for the external users (Alihodzic and Dzafic, 2012). The BEX model has been developed for the Croatian capital market but its application is also possible for the business evaluation of the companies that operate in a similar business environment.

The research methodology consists of a theoretical analysis of numerous research papers that deal with the issue of company's bankruptcy prediction model with the issue of company's bankruptcy prediction models. Computer software is used to calculate the company's ongoing financial stability the objective of which is to predict the risk of potential bankruptcy of the company.

The paper will contribute to the financial analysis and financial prediction theory and practice. As far as we know, there is no similar software (developed by any authors) that can be used to predict business success or failure of the Macedonian companies, based on the BEX model.

The paper continues with a literature review which refers to understanding the financial distress concept and various models for predicting the financial distress of the companies. The second part of the paper analyses have been applied as well as the explanation of the BEX model. The third part of the paper presents the developed software based on the BEX model. Its last part offers a conclusion and recommendations for the future studies.

II. LITERATURE REVIEW

For more than five decades, economists from all over the world have been trying to find out models that will help them to predict bankruptcy of the companies. The models for predicting the financial health of the companies have been used to estimate whether certain firm is financially stable or there is a bankruptcy danger (Sarlija and Jeger, 2011). Models are structured by using a variety of financial ratios to evaluate the financial reports and measure the financial performance (Panovska, Boshkoska, Prisaganec, 2010). Financial ratios could be used in managerial, credit and investment analyses/Almansour, 2015).

Outecheva, N. (2007, p.28) describes the financial distress as a sharp failure of the firm's performance and value (Figure 1). If the managers identify negative effects in time, the downward spiral in the financial distress can be broken and the firm does not turn into an insolvent one. A company is insolvent when it is unable to pay its financial obligations as they are getting due.
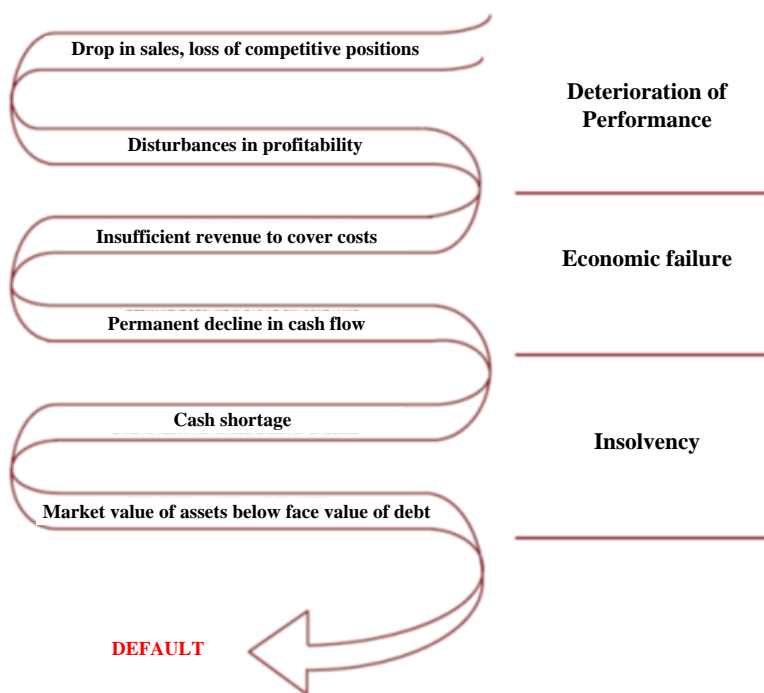
Figure 1 - Downward spiral in financial distress

Source: Outecheva, N. (2007). "Corporate financial distress: An empirical Analysis of Distress risk". Doctoral dissertation, University of St.Gallea, Bamberg, p32.

In their paper, Karas and Reznanova (2012) confirm that a lot of authors like Altman, Lin, Chen, Nieman and others have been trying to find out a sustainable and accurate model for prediction of the financial problems and bankruptcy of the companies. Sarlija and Jeger (2011) fasten their attention on several aspects:
- In the course of time, models for financial difficulties prediction lose their accuracy for prediction.
- According to Mersah, researchers analyze the data during the period of several years without taking cognizance of the current economic events during the research period (quoted by Sarlija and Jeger, 2011).

Beaver (1996) and Altman (1968) have presented the first modern statistical models for financial failure prediction of the firms. Beaver's model could predict the bankruptcy of a company for at least five years before it happened. In his researches, Beaver has come to a conclusion that, in thirty financial indicators, the best bankruptcy predicting indicator is: a cash flow/a total dept (Christidis and Gregory, 2010).

Altman (1968) was the first author who implemented the Multiple Discriminant Analysis (MDA) in financial analyses and set the Altman Z – score Bankruptcy Prediction Model. MDA includes evaluations and categorical values which are combined in order to get Credit Risk Score by which it is defined which of the companies are successful and which of them are unsuccessful. (Madzova, 2010). "MDA is a statistical technique used to classify an observation into one of several a priori grouping dependent upon the observation's individual characteristics." (Altman, 2000, p.5) The advantage of MDA is that many characteristics could be shown into a single score. In his Z- score model, Altman included sixty-six companies, thirty-three of which were successful while the other thirty-three companies had already become bankrupt. He started his researches with twenty – two financial indicators, classified in five categories (profitability, leverage, liquidity, solvency and activity). His purpose was to choose a smaller number of indicators that could be helpful to make a distinction between a financially healthy firm and a firm which was becoming bankrupt. With the support of MDA he chose five financial indicators. In the evaluations of the first Z – score model, he included only publicity held manufacturers, but, since then, he has made evaluations again about: private productive firms, nonproductive firms and service ones. (Meeampol, at all, 2014) In 2012, Prof. Altman widened his first model and set his "Altman Z – Score Plus" – application. "The new Altman Z – Score Plus covers: 1) Non – US Companies, including those in developing markets; 2) Public and private non-manufacturing firms (Z-score) and 3) Privately-held industrial manufacturing firms (Z-score) (NYU Stern, 2012).

Chancharat N., in his research, emphasizes that Johnsen and Malicher have developed a multi nominal logit model for predicting the corporate bankruptcy and financial distress. This model significantly reduces the misclassification errors of the non-bankrupt, financially week and bankrupt firms. They studied the importance of information in forecasting corporate bankruptcy. In order to avoid the company bankruptcy, managers need to analyze the reasons that could lead the company to the edge of bankruptcy. These are some the reasons: problems with the settlement of the claims, insufficient investments in research and development, poor decision making, inadequate cash flow planning, cash shortages, loos of capital, loss of competitive advantages, etc.

Belak explains that most of the similar models are directed towards the prediction of the future danger of financial problems and bankruptcies while the BEX model allows evaluation of the business excellence and predicts the success and failure of the firm in relation to the managing and achieving results (Vusic, 2007).

BEX – model uses financial indicators which are estimated by using the data from the Income Sheet and the Balance Sheet of the companies. With this mode, a fast and simple evaluation of the solvency of the companies can be done. Evaluation of the BEX – index and marginal values have been elaborated below.

III. RESEARCH METHODOLOGY

As previously indicated, computer software is used to estimate the current financial stability of the company in order to predict the risk of a possible bankruptcy. Our research attempts to give the answer to the following question: Is it possible for a software to be able to help the financial managers to anticipate the risk of bankruptcy? We are looking for the answer to this question by using a combination of financial indicators as well as computation and simulation techniques.

Our software uses BEX – model which shows and measures the business excellence of the company in two dimensions: current business (lagging dimension) and expected business excellence (leading dimension) (Alihodzic and Dzafic, 2012). Financial indicators used to estimate the actual results of the performance of a company are: profitability, value creation, liquidity and financial strength (Mihic, Umihanic and Fazlovic, 2015, p.83). BEX is calculated according to the following formula (Belak and Ajinovic – Barac, 2008):

$$BEX = 0.388ex1 + 0.579ex2 + 0.153ex3 + 0.316ex4 \qquad (1)$$

Where:

The ex1 is a profitability indicator and it is calculated as the ratio of earnings before interest and tax. The ex1 shows earning capability of the company.

$$ex1 = \frac{EBIT}{Total\ Assets} \qquad (2)$$

The ex2 is values creation indicator. The value of this indicator should be equal to 1 or higher (Mihic, Umihanic and Fazlovic, 2015, p. 89).

$$ex2 = \frac{Net\ operating\ profit}{Equity\ capital \cdot cost\ of\ equity} \qquad (3)$$

The ex3 is a liquidity indicator. Working capital is calculated as a difference between the current assets and the current obligations of the company. Model authors emphasize that this indicator should be 25% or more.

$$ex3 = \frac{Working\ capital}{Total\ assets} \tag{4}$$

The ex4 is a financial strength indicator. The ex4 index is based on the ratio of theoretically free cash flow from all activities, which is the profit increased by the amortization and reduction, which has covered all the obligations with that money. The faster the obligations are covered from the cash flow, the more progressively the excellence increases. (Alihodzic and Dzafic, 2012, p.11).

$$ex4 = \frac{5\ (Net\ Profit + Depreciation + Amortization)}{Total\ debt} \tag{5}$$

The companies whose BEX-index is higher than 6.01 are the first-rate companies; those with BEX-index between 4.01 and 6.00 are excelled; the companies with BEX-index between 2.01 and 4.00 are very good; those with BEX-index between 1.01 and 2.00 are good, and finally, those with BEX-index within the limits of 0.00 and 1.00 are of a marginal value while the companies whose existence is in danger have BEX-index lower than 0.00 (Muminovic, Pavlovic, 2012).

IV. AN OVERVIEW OF THE BUSINESS EXCELLENCE PREDICTION SOFTWARE

Most businesses spend a lot of time and effort on predicting because they need to plan the uncertain future. Prediction is of a crucial importance for the managers especially in the decision making process. Furthermore, prediction is also an important activity for the financial managers since the economic consequences of a corporate failure are really big for the whole society: if financial managers could predict the failure of the company, they would be able to take a necessary action in time.

Financial models that might help to estimate the success or the failure of the companies are of great importance for every manager. As a tool, they are of an inestimable value when it is necessary to make a certain financial decision in order to choose the best solution and avoid potential mistakes. If often happens in practice when managers avoid the use of financial models, because in most of the cases, they are complex mathematical formulas which is why they make decisions by intuition. This way of making decisions will be avoided if there is a software package which will automatically show the success or the failure of the company by a simple inserting of some values from the financial reports. The software will have a greater use for the managers if it allows making simulation about how certain financial decision will affect the future financial standing of the company.

We use the BEX model (Formula 1.) to develop our software primarily because it is the most suitable model for the Macedonian Business Environment. This model allows a quick and simple evaluation of the business excellences of the companies as well as their success or failure (Pavic A., 2007). The BEX model variables are the following financial indicators: profitability, value creation, liquidity and financial strength indicators.

In order to make the use of the software much easier, the basic BEX model formula has been resolved by replacing the four variables with mathematical representatives for each of them. The model gained in that way and it is used as the basis to estimate the BEX index. After activating the software, a window appears where, on the upper part, the BEX model formula is only figuratively displayed. Immediately after the formula, the resolved BEX model follows. It is composed of eleven indicators: EBIT, Total Assets, Net Operating Profit, Equity, Equity Cost, Working Capital, Total Assets, Net Profit, Depreciation, Amortization and Total Debt. Each of the variables is placed in a rectangle in which the variable name is displayed. Below the name, the box for the variable value is found and below it, there are two tabs with arrows to the left and to the right (Figure 2). In the application, the variable values are directly inserted in the box while the tabs are used for their modelling, mostly during the simulation of some financial statement. The tabs are used to reduce/ to increase the value of the variable with a step of 5%. (Figure 2)
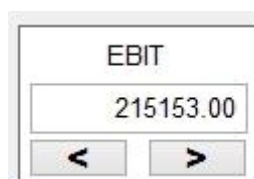

Figure 2 - **Individual BEX variable box**

Figure 3 shows the real financial statement of "Granit" – Joint Stock Company, in 2014, estimated by using the formula for the BEX – index. On the bottom of the left side of the window, we see the estimated BEX-index about the concrete values of the model variables. The result of the estimated BEX-index is displayed in a different color depending on its value which interacts with the successfulness or unsuccessfulness of the company. The index value smaller than "0" is displayed in red color, and the values larger than 1.01 - 6.01 are displayed in a different intensity from the light-green to the darkest-green color. The results shown in this way enable the managers to get a visual image about the level of successfulness of the company.
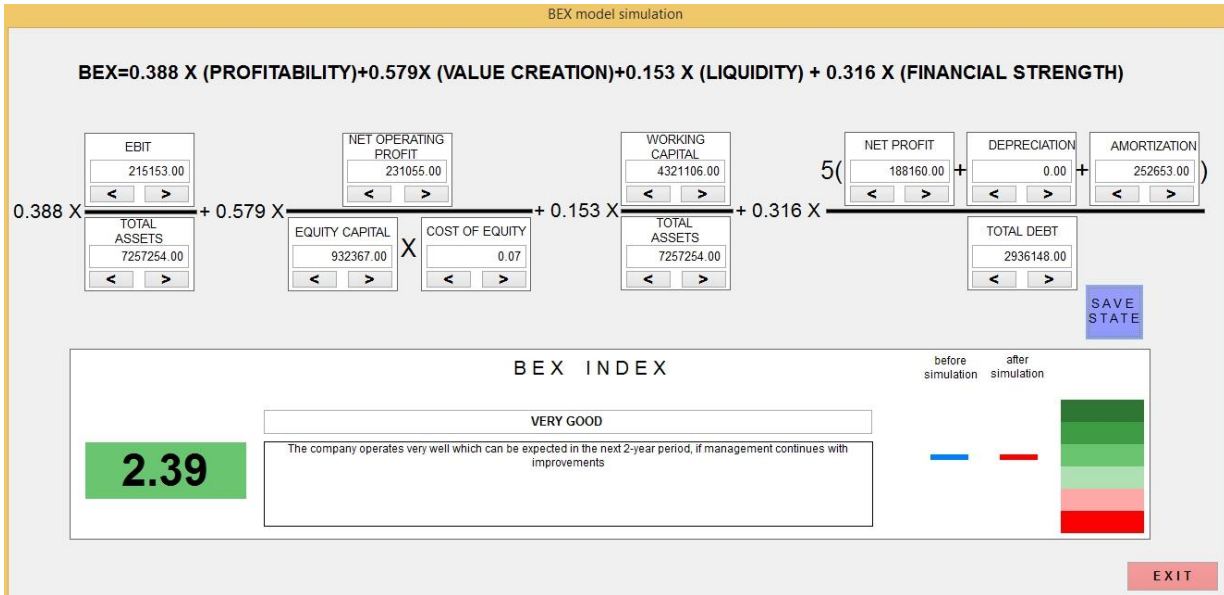
Figure 3 - Initial outlook of the Software interface

To the right of the BEX-index, depending on its value, the category to which the company belongs to is written down, including the first – rate company or the company the existence of which is in danger, with the explanation of its meaning. In the right part, there is a visual review of the review of the BEX – index depending on the variables value before and after the simulation, with the help of two lines. The line before the simulation is blue while the line after the simulation is red. To the right of the lines, there is a grading scale of colors about the success of the company. In this way, the manager has a visual review of the BEX – index value, before and after the simulation, i.e. a review about the successfulness of the company before and after the simulation.

In the beginning, when activating the application, as all the values of the variables are "zero", both of the lines are positioned on the level of the pink color. After inserting the values of the financial indicators of the company, the BEX – index is automatically estimated while the two lines are positioned on the same level.
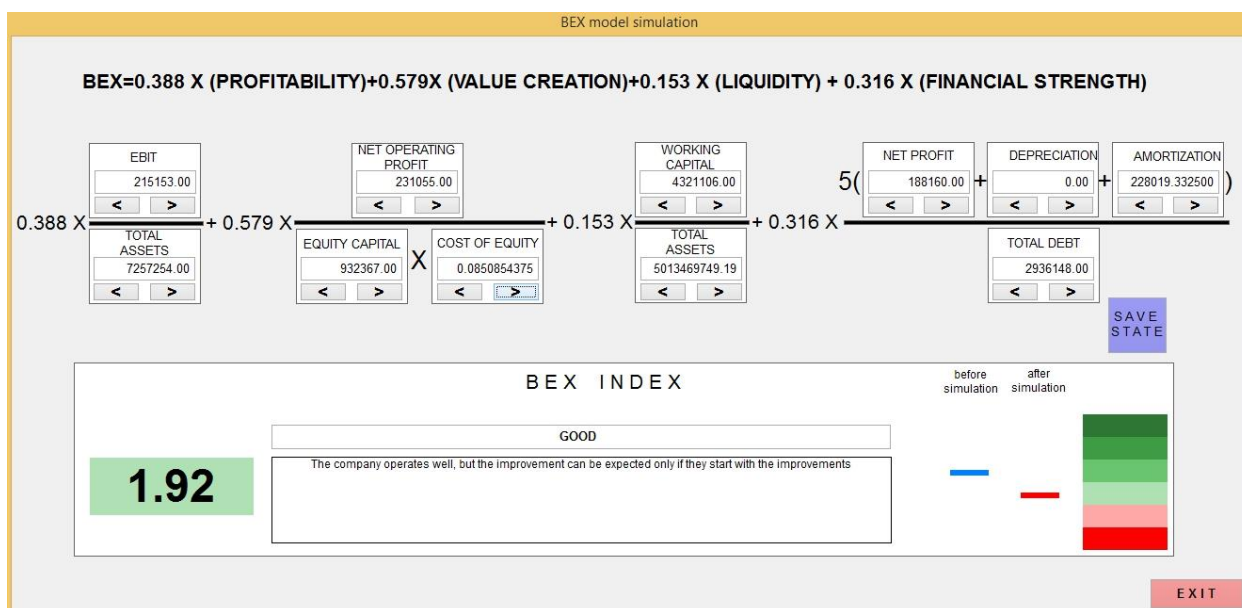
Figure 4 - Outlook of the Software Interface after the simulation

Before starting the simulation, it is necessary to press the Save State box which the application records the starting state and the simulation can be started. During the simulation, the application is estimating the new level of the red line by which it is possible to observe the change of simulation visually in relation to the starting value (Figure 4).

V.   CONCLUSION AND RECOMMENDATION

As Salehi and Abedini (2009) summarized, the existence of a financial distress can finally lead to bankruptcy of the business. If managers identify the business financial distress risk in time, they will be able to take adequate corrective actions for its exclusion.

In this research paper, prediction software has been developed by using the BEX model. Implementation of this software in managerial practice can directly affect the overall business strategy because it can be useful for prediction of the financial distress risk.

As the advantages of the previously presented software, we could state the following ones:

- A quick and easy estimation of the BEX model by the managers for the evaluation of the current and future financial success of the company;
- A visual presentation of the BEX index and the companies ranking from the first-class companies to the ones the existence of which is in danger;
- A parallel comparison of the BEX index before and after the simulation of the financial statement of the company;
- The software is a simple tool that could help the managers to get the information they need when making crucial financial decisions;
- The application might be used for educational purposes and it could also be a professional tool when making financial decisions by the managers of the companies.

This disadvantage of the BEX model is that it is not equally effective for different activities. It is more effective when estimating the financial statement of the companies to use two or more models which will lead to a more concrete image of the financial statement of the company.

Our recommendation for the future researchers is to make an analysis and a comparison of the accuracy of two or more models, for example, Altman's Z' – Score, Ohlson's O' – Score Model, Beaver, Springate, Zmijewski's Model, FP Rating model or BEX index, in prediction of the bankruptcy of the Macedonian companies. This comparison will allow choosing a model which will help us to make the most accurate estimation of the risk of bankruptcy of the Macedonian companies.

VI. REFERENCES

1. Alihodzic, A and Dzafic, J. (2012). Models for the evaluation of business excellence in capital market of Bosnia and Herzegovina, Singidunum Journal of Applied Science, (pp.9-15). Belgrade.
2. Almansour, B (2015). Empirical Model for Predicting Financial Failure. American Journal of Economics, Finance and Management, Vol.1, No.3, pp.113-124.
3. Altman, E (1996). Financial ratios, discriminant analysis and the prediction of corporate bankruptcy. The Journal of Finance, 23(4), (pp.598-608).
4. Altman, E (2000). Predicting financial distress of companies: Revisiting the Z-Score and Zeta Model. Retrieved March, 2016, from http://people.stern.nyu.edu/ealtman/Zscores.pdf.
5. Beaver (1996). "Financial Ratios as Predictors of Failure. Journal of Accounting Research, 4, pp.71-111.
6. Belak, V and Barac-Zeljana, A. (2008). Secrets of the capital market: BEX index, analysis of financial statements, performance indicators of the investment and decision models. Zagreb, Belak excellens d.o.o.
7. Chancharat, N. at.all (2010). Multiple States of Financial Distressed Companies: Tests using a Competing – Risk Model. Australasian Accounting Business and Finance Journal, Vol.4, Issue 4.
8. Christidis, A and Gregory, A (2010). Some New Models for Financial Distress Prediction in the UK. Centre for Finance and Investment Discussion Paper, No.10/04.
9. Dahlgaard, J.J., Chen, C.-K., Jang J.-Y., Banegas, L.A., & Dahlgaard-Park, S. (2013). Business Excellence Models: Limitations, Reflections and further Development. Total Quality Management & Business Excellence, Vol.24, Issue 5-6.
10. Edmunds – Asche, S and Media, D (n.d.). Hot to determine the financial stability of a small business. Retrieved March, 2016, from http://smallbusiness.chron.com/determine-financial-stability-small-business-58597.html.
11. Jezovita, A. (2015). Designing the model for evaluating financial quality of business operations – evidence from Croatia. Management: Journal of Contemporary Management, Vol. 20 Issue 1, p101.
12. Karas, M and Reznakova, M (2012). Financial Ratios as Bankruptcy Problem: The Czech Republic Case. Proceedings of the 1st WSEAS International Conference on Finance, Accounting and Auditing (FAA '12), pp.86 –91.
13. Keglević Kozjak, S, Šestanj-Perić, T, and Bešvir, B (2014). ASSESSMENT OF BANKRUPTCY PREDICTION MODELS' APPLICABILITY IN CROATIA. Proceedings of 7th International Conference "An Enterprise Odyssey: Leadership, Innovation and Development for Responsible Economy", Croatia.
14. Madzova, V (2010). Models to assess the creditworthiness of the bank's customers. Center for Banking and Finance, Skopje, 2010.
15. Meeampol, at all. (2014). Applying Emerging Market Z-Score Model to Predict Bankruptcy: A Case Study of Listed Companies in the Stock exchange of Thailand (Set). Management Knowledge and Learning, 25 -27 June, Slovenia.
16. Mihic, A, Umihanic, B and Fazlovic, S. (2015). The role of organizational innovation in achieving and maintaining company's business excellence. Management: Journal of Contemporary Management Issues, Vol.20 No.1 June 2015.
17. Muminovc, S, Pavlovic, V and Joksimovic, D. (2012). Profitability and business excellence analysis of dairy industry in Serbia. Dairy 62 (3), 207-218.
18. Muminovic, S and Pavlovic, V. (2012). The impact of revaluation on BEX index calculation for stocks listed on Belgrade Stock Exchange, Journal of Accounting and Management, pp.17-27.
19. Novak, B. (2003). Predicting business difficulties of banks in Croatia. Economic review, 54 (904-924), Croatian Economic Association, Zagreb.
20. Outecheva, N. (2007). Corporate financial distress: An Empirical Analysis of Distress Risk. Doctoral dissertation, University St.Gallea, Bamberg.
21. Panovska, V., Boshkoska, M and Prisaganec, M (2010). Computer visualization and simulation of financial reports. INFOFEST – Budva.
22. Pavic, A (2007). Croatian index to forecast the company's operations, The Business Daily, Croatia, Retrieved February, 2016. http://www.poslovni.hr/trzista/hrvatski-indeks-za-prognozu-poslovanja-tvrtke-56789.
23. Salehi, M and Abedini, B (2009). Financial Distress Prediction in Emerging Market: Empirical Evidences from Iran, Business Intelligence Journal - August, 2009 Vol. 2 No. 2.
24. Sarlija, N and Jeger, M (2011). Comparing financial distress prediction models before and during recession. Croatian Operational Research Review (CRORR), Vol. 2.
25. Silvanaviciute, S. (2008). Estimating the Negative Impact of Business Failures in Lithuania. Social Research, N.4 (14), pp.113-120.
26. Vuko, L. (2007). BEX – world class, Free Dalmatia, Croatia, http://arhiv.slobodnadalmacija.hr/20070918/biznis01.asp.
27. Vusic, D. (2007). Business excellence. Technical Journal, University in Varaždin, Croatia, pp.51-54, http://hrcak.srce.hr/index.php?show=clanak&id_clanak_jezik=127965.
28. http://www.flexstudy.com/catalog/schpdf.cfm?coursenum=9522a, Retrieved April, 2016.
29. http://www.stern.nyu.edu/experience-stern/faculty-research/altman-launches-zscore-plus, Retrieved February, 7, 2016.