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## Selection of key performance indicators of chosen industry and their application in formation of Creditworthy model

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### Abstract

This paper is devoted to the issue of business performance. It is dedicated to more detailed elaboration of performance, key performance indicators, measurement and evaluation of the performance of selected industry applying Creditworthy model as well as risk factors influencing performance of businesses from given industry. Nowadays modern performance indicators are adopted as well as mathematical and statistical methods are applied in assessing business performance. In this paper this problem is solved by the application of correlation matrix constructed for a chosen indicators` group in order to select key performance indicators. Subject for objective fulfilment was a group of businesses operating in the same Slovak industry. The most difficult point of solution was the selection of appropriate inputs for the construction of correlation matrix as well as the collecting of sufficient amount of relevant data to ensure analytically-based outputs. Benefit of this paper is formation of Creditworthy model with the application of key performance indicators and risk factors of businesses from selected industry. Creditworthy model designed in such a way allows to influence and measure the performance of given industry in terms of key performance indicators and to eliminate specific risks of businesses from given industry.

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*Keywords:* Correlation matrix; Creditworthy model; Economic Value Added; Financial Performance; Risk

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### 1. Introduction

Business performance measurement has become an important phenomenon of today. To measure the performance, variety of methods is used. In addition to the traditional methods, based on the calculation of the conventional indicators of financial analysis, the modern indicators begin to apply. These indicators include effects

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and risks of surroundings, non-financial indicators and also indicators focused on the future revenues and achievements resulting from the current decisions.

There are many different definitions of business performance. According to Wagner (2009) business performance is a characteristic which describes the way in which a business makes a particular activity in parallel with a reference way of making this activity, while the interpretation of performance is expressed by organized relationship between examined and reference way of performing activities according to the selected criterion range. Among the representatives who understand the performance as the enterprise ability to capitalize its investments embedded into business in the best way are the authors Neumaierová, Neumaier (2002); Frost (2005). Specific issue is the different performance evaluation of various business entities such as owners, managers and customers (Šulák, Vacík, 2004). Enterprise performance can be evaluated differently. It depends on market participant, who is making the review (Stýblo, 2008). Valach (1998) approaches to the definition of the performance in the same way – he points out that the participant for whom the evaluation is done is important, whether it's a customer or shareholder. The enterprise is powerful when it satisfies customer product requirements. The business is powerful for the shareholder when it provides adequate return related to risk (Valach, 1998).

Proponents of the Value Based Management indicate that the value of the company is determined by its performance and according to this theory enterprise is a tool whose task is capitalization of shareholder investments (Neumaierová, 2003). Another definition describes business performance as the company's ability to transform inputs to outputs (Johnson, Kevan, 2000). Several authors indicate the need for the comparison of performance with the target value (Nenadál, 2004). European Foundation for Quality Management (EFQM) defines performance as the level of results achieved by individuals, groups, organizations and processes.

The most common method of assessing the financial and economic performance of the company are methods of fundamental or technical analysis, which evaluate the enterprise in economic terms based on a detailed study and analysis of financial statements (Fisher, 1992). In the opinion of many Slovak and foreign authors as the most common indicators to measure the performance of companies are used the financial indicators (Ittner, Larcker, Randall, 2003; Dixon, Nanni, Vollmann, 1990; Pavelková, Knápková, 2009; Synek, 2003; Petřík, 2009). These conventional indicators are based mainly on profit maximization – the primary goal of business. They map the main activities of the company in the areas of profitability, ability to pay and investment area in terms of value for investors.

These financial goals and measures represent focus point at which the goals and measures of other areas of business are targeted. Without considering the financial aspects of the business and without long-term profits the company would not exist. It is necessary to define objectives demonstrating the eligibility of future existence of the company, i.e. such capitalization of Equity that in the view of other options represents the best solution. For this purpose, it is appropriate to use indicators of profitability and turnover, as well as indicators related to the liquidity of the company (Cash flow, Cash-to-cash, etc.).

According to the argument that the objective is not only to measure, but in particular to improve performance (Hammer, 2007), it must be noted that these conventional financial ratios have low predictive value in analysing and evaluating the financial performance of the company, in terms of making tactical and strategic decisions in management. This is caused by the fact that these results are judged rather isolated. Conventional performance indicators do not answer the question why the overall results achieve such values or which areas of the company should be improved in order to meet company's strategic objectives. It is therefore important to supplement conventional financial indicators with another more dynamic and more prospective indicators, which are adjusted to specific competitive conditions. It means to focus on monitoring business performance results and their comparison with the planned performance level, monitoring the strategies direction during their implementation, identifying the accompanying problems of fundamental importance and performing the necessary changes and adjustments (Dudoková, 2004). Development of modern indicators of performance evaluation focused on the processing and designing of indicators most closely connected to the value of shares. These indicators should also enable to use the most of accounting information and data, include calculation of risk, take into account the range of related capital and finally should allow performance evaluation and also the enterprises valuation (Mařík, Maříková, 2005). The performance assessment should be approached from different perspectives, in assessing it from the position of the shareholder, the evaluation is based on return on invested capital into the company, while every shareholder is expecting profitability adequate to risk (Neumaierová, Neumaier, 2002).

Therefore basic financial fields of evaluation and measurement of business performance according to Kislingerová (2011) can be supplemented by more recent and modern indicators and methods, namely evaluation using modern methods with the application of market characteristics such as indicators EVA, INEVA MVA, RONA, WACC or indicators based on FCF, CVA and others. From these indicators a suitable tool for benchmarking comparison are EVA, WACC and Cost of Equity, excellent benchmarking tool is absolute or relative spread -  $(ROE - r_e)$ .

In the light of above-mentioned, the following research problem was formulated: Are nowadays, when it is very difficult to manage and stabilize performance, conventional financial indicators sufficient measure of performance? Do the enterprises need to use appropriate key performance indicators to make performance management more sophisticated?

In this regard the aim of this paper was to suggest key performance indicators for the chosen industry with the application of correlation matrix and apply them for the formation of Creditworthy model.

## 2. Material and Methods

Initial group of indicators used for the formation of correlation matrix is represented by conventional indicators of financial analysis, namely Return on Assets (ROA), Return on Equity (ROE), Return on Sales (ROS), Current Ratio (CR), Total Liquidity (TL), Assets Turnover (AT), Turn around Receivables (TAR), Turn around Liabilities (TAL), Equity Ratio (ER), Indebtedness (I), Overcapitalization (O), Interest Coverage (IC). This group of indicators contains indicators assessing profitability, liquidity or solvency of enterprise, activity or capital structure and indebtedness and financial stability of enterprise.

In this paper enterprise performance was measured and calculated with the use of the EVA indicator generally considered to be the top indicator of the enterprise performance evaluation. There are many ways of calculating the EVA indicator. From these approaches method of Entity – formula (1) (Mařík, Maříková, 2005) and method of Equity – formula (2) (Neumaierová, Neumaier, 2002; Horváthová, Mokrišová, Suhányiová, 2013) were applied:

$$EVA_{entity} = NOPAT - WACC * NOA \quad (1)$$

where

*NOPAT* - Net Operating Profit after Tax,

*WACC* - Weighted Average Capital Cost,

*NOA* - Net Operating Assets,

$$EVA_{equity} = (ROE - r_e) * E \quad (2)$$

where

$r_e$  - Cost of Equity,

*E* - Equity.

To calculate the EVA indicator, it is necessary to determine Cost of Equity. For this purpose several methods are used, while the most commonly applied model in the Slovak Republic is one of the Models with Gradual Counting Risk Premium – INFA model (Neumaierová, Neumaier, 2002), which was used also in this paper. Cost of Equity based on the INFA model is calculated as the sum of Risk-free Rate of Return and Risk Premium according to formulas (3) and (4) (Neumaierová, Neumaier, 2002):

$$r_e = r_f + RP \quad (3)$$

where

$r_f$  - Risk-free Rate of Return,

*RP* - Risk Premium.

RP can be divided into four partial Risk Premiums:

$$r_e = r_f + r_{LA} + r_{business} + r_{finstab} + r_{finstr} \quad (4)$$

where

- $r_{LA}$  - Risk Premium for Lower Stocks Liquidity in the Market,
- $r_{business}$  - Risk Premium for Business Risk,
- $r_{finstab}$  - Risk Premium for Financial Risk,
- $r_{finstr}$  - Risk Premium for the Risk of Capital Structure.

To assess the impact of financial indicators on the EVA indicator, the correlation matrix was applied. Its results were used to determine key financial indicators influencing the financial performance of the selected industry. Correlation matrix based on Spearman's correlation was processed with the use of software Statistica. This software marked the correlations, in which P values were less than significance level of 0.05. In these cases we reject the null hypothesis  $H_{01}$  in favor of the alternative hypothesis  $H_{11}$ . Therefore we conclude that the studied linear relationship between given variables is statistically significant.

The sample for the performance calculation and evaluation consisted of companies running a business within the energy industry, namely thirty companies active in the field of heat supply in the Slovak Republic. As a source of information web pages and annual reports of these companies were used. Financial indicators were calculated for the year 2013. Whereas these companies required not to publish the data provided, they were mentioned in this contribution anonymously.

Key performance indicators resulting from correlation matrix were applied to create Creditworthy model. This model represents the portfolio in which X-axis is applied to the sum of scores of the sectoral risk and the Y-axis is applied to the sum of scores of the financial performance. At the intercept point of these values company's position in terms of performance evaluation is located. Creditworthy model includes 12 fields which allow classification of the enterprise into the corresponding performance range (see Fig. 1). The portfolio consists of performance fields marked as follows: inappropriate, doubtful, substandard, watch, excellent (Horváthová, Mokrišová, Suhányiová, 2013).

The best performance achieve companies located in the portfolio in performance field "excellent". However in this position, there is scope for improvement of business performance too. Position in performance field "watch" creates more possibilities for further improvement. The average value of performance is entitled as "substandard". The worst performance fields represent positions "doubtful" and "inappropriate". To assess financial performance with the use of Creditworthy model, we specify group of key performance indicators selected based on correlation matrix, fundamental factor affecting business performance and risks and INFA model, namely Return on Assets, Return on Equity, Current Ratio, Assets Turnover, Turn around Liabilities, Turn around Receivables, Equity Ratio and Indebtedness. To evaluate risk in Creditworthy model, internal and external risks applied in the calculation of Cost of Equity were used, namely Risk Premium for lower stocks liquidity in the market, Risk Premium for business risk, Risk Premium for financial risk, Risk Premium for the risk of capital structure, Equity Risk Premium, Country Risk Premium, Levered  $\beta$  and Risk-free Rate of Return.

When creating the Creditworthy model, the method of scoring was used for the transformation of performance indicators and internal and external risks to the scores. Each of the given set of indicators was assigned by corresponding number of points. The maximum score is 10 points.

We calculated the scores of indicators, development of which should be growing, by putting the highest value of the indicator to the denominator of the equation (5) (Horváthová, Mokrišová, Suhányiová, 2013):

$$b_{ij} = \frac{x_{ij}}{x_{imax}} * 10 \quad (5)$$

We calculated the scores of indicators, development of which should be declining, by putting the lowest value of the indicator to the numerator of the equation (6) (Horváthová, Mokrišová, Suhányiová, 2013):

$$b_{ij} = \frac{x_{imin}}{x_{ij}} * 10 \quad (6)$$

where

$x_{ij}$  is the value of the  $j$ -th explanatory variable associated with enterprise  $i$ ,

$x_{jmax}$  is the highest value of the  $j$ -th explanatory variable assessed by 10 points, it refers to the indicators, development of which should be growing,

$x_{jmin}$  is the lowest value of the  $j$ -th explanatory variable assessed by 10 points, it refers to the indicators, development of which should be declining,

$b_{ij}$  is the score of the enterprise  $i$  for the  $j$ -th explanatory variable.

In accordance with the stated objective and mentioned methods of solution, scientific hypotheses were set up. These hypotheses were tested with the use of correlation matrix at the significance level of 0.05.

$H_{01}$ : There is no statistically significant linear relationship between selected financial indicators and the EVA indicator.

$H_{11}$ : There is statistically significant linear relationship between selected financial indicators and the EVA indicator.

### 3. Results and Discussion

In this part of the paper the selection of key performance indicators for the analyzed industry is performed. Firstly we calculated financial indicators as well as the EVA indicator for each of thirty analyzed businesses. To calculate EVA indicator we applied method of Equity and also method of Entity. Whereas the results of correlation matrices applying EVA equity and EVA entity were very similar, we present only correlation matrix for EVA equity (Table 1). In this correlation matrix the correlations, in which P values are less than significance level of 0.05, are highlighted.

Table 1. Correlation matrix for EVA equity.

**Spearman's correlation** (Financial indicators)

Marked correlations are significant at the level  $p < .05000$   $N=30$

Variable	ROA	ROE	ROS	CR	TL	AT	TAR	TAL	ER	I	O	IC	EVA equity
<b>ROA</b>	1.000	0.853	0.819	0.295	0.277	0.612	-0.197	-0.451	-0.101	0.107	0.076	0.526	0.785
<b>ROE</b>	0.853	1.000	0.716	0.135	0.087	0.494	-0.164	-0.233	-0.459	0.464	-0.274	0.443	0.855
<b>ROS</b>	0.819	0.716	1.000	0.097	0.079	0.152	0.057	-0.066	-0.224	0.230	-0.156	0.445	0.599
<b>CR</b>	0.295	0.135	0.097	1.000	0.964	0.398	0.178	-0.624	0.460	-0.457	0.660	0.239	0.401
<b>TL</b>	0.277	0.087	0.079	0.964	1.000	0.349	0.139	-0.619	0.554	-0.550	0.725	0.258	0.341
<b>AT</b>	0.612	0.494	0.152	0.398	0.349	1.000	-0.234	-0.684	0.115	-0.115	0.319	0.407	0.564
<b>TAR</b>	-0.197	-0.164	0.057	0.178	0.139	-0.234	1.000	0.401	0.001	0.000	0.094	-0.138	-0.160
<b>TAL</b>	-0.451	-0.233	-0.066	-0.624	-0.619	-0.684	0.401	1.000	-0.463	0.462	-0.527	-0.281	-0.377
<b>ER</b>	-0.101	-0.459	-0.224	0.460	0.554	0.115	0.001	-0.463	1.000	-1.000	0.892	0.111	-0.354
<b>I</b>	0.107	0.464	0.230	-0.457	-0.550	-0.115	0.000	0.462	-1.000	1.000	-0.892	-0.106	0.359
<b>O</b>	0.076	-0.274	-0.156	0.660	0.725	0.319	0.094	-0.527	0.892	-0.892	1.000	0.207	-0.111
<b>IC</b>	0.526	0.443	0.445	0.239	0.258	0.407	-0.138	-0.281	0.111	-0.106	0.207	1.000	0.413
<b>EVA equity</b>	0.785	0.855	0.599	0.401	0.341	0.564	-0.160	-0.377	-0.354	0.359	-0.111	0.413	1.000

Source: Authors calculating and processing in software

Based on the correlation matrix we can conclude that the most significant impact on the EVA indicator have profitability indicators. The most relevant statistically significant directly proportional relationship is detected between Return on Equity and the EVA indicator. This dependence is expected since ROE is one of the inputs for the calculation of the EVA indicator. Correlation matrix indicates also statistically significant directly proportional relationship between Return on Assets and the EVA indicator. This influence can be explained by the fact that ROA indirectly enters into the calculation of the EVA indicator in estimating Risk Premium for business risk ( $r_{\text{business}}$ ). Significant directly proportional relationship is between Return on Sales and the EVA indicator. In this case we can conclude that values of Profit Margin for individual businesses positively affect ROA in INFA model and contribute to business performance improvement.

Another statistically significant directly proportional relationship is between Assets Turnover and the EVA indicator. Values of this indicator positively affect ROA in INFA model and contribute to business performance improvement. On the basis of this finding the validity of the INFA model is confirmed, because this model in its pyramidal decomposition indicates directly proportional dependence between mentioned indicators. Indicator Assets Turnover is according to INFA model considered as a key performance indicator.

Correlation matrix indicates also the influence of Current Ratio and Interest Coverage on the EVA indicator. This influence can be explained by the fact that these indicators indirectly enter into the calculation of the EVA indicator in estimating individual Risk Premiums - Risk Premium for financial risk ( $r_{\text{finstab}}$ ) and Risk Premium for the risk of capital structure ( $r_{\text{finstr}}$ ).

Based on the correlation matrix we can conclude that the only inversely proportional statistically significant relationship is between Turn around Liabilities and the EVA indicator. This dependence is expected because the lower value of Turn around Liabilities means the better value of Cash-to-cash – indicator, which positively affects business performance.

In assessing financial performance of analyzed businesses we found that the problematic area for many of them is the value of Current Ratio. Although in the total score this indicator reached fourth place from the eight evaluated indicators, 16 from 30 assessed businesses achieved in this indicator zero points. When evaluating Current Ratio, any of the businesses reached 10 points. The least problematic financial indicator is Equity Ratio, which received first place with total score of 143 points. In the analyzed businesses, the highest partial score of 10 points reached indicator Indebtedness.

Table 2. Inputs for the formation of Creditworthy model.

Company	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
<b>Financial Performance</b>	42	25	8	23	24	12	37	13	22	21	16	55	18	47	28
<b>Risk</b>	67	62	48	51	56	57	66	36	57	67	57	56	56	66	57
<b>Score</b>	108	87	56	75	81	69	103	49	79	87	73	111	74	113	85
<b>Degree of priority</b>	3	13	29	20	16	26	5	30	18	12	23	2	21	1	14
Company	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
<b>Financial Performance</b>	31	16	34	30	14	46	32	26	13	21	21	48	14	17	16
<b>Risk</b>	67	66	66	67	57	56	57	66	53	59	56	60	52	56	56
<b>Score</b>	98	82	100	97	71	102	89	92	65	79	77	108	65	73	72
<b>Degree of priority</b>	8	15	7	9	25	6	11	10	27	17	19	4	28	22	24

Source: Authors

If we look at the results achieved by analyzed businesses (see Table 2), we can see that the best position in the financial performance achieved company no. 12. The company gained this position despite the fact that it was not at the first place in overall ranking, since the order was determined also by risks which the business has to overcome and which affect business performance. Company no. 12 achieved in the financial performance score of 55 points, which represents 68% of the total achievable score. It means that company no. 12 has reserves in financial

performance too, particularly in the profitability, liquidity and capital structure as well as in the indicator Turn around Receivables. Although company no. 12 achieved the best financial performance of all evaluated companies, it lost 10 points in the area of risk compared to the best company no. 14 in overall ranking. The difference between companies no. 12 and 14 was caused by the value of Risk Premium for the risk of capital structure. The least efficient was company no. 3, which from the total score of 80 points achieved only approximately 10%. In total the worst position in financial performance and sectoral risk achieved company no. 8. In the case of this business it is necessary to pay more attention to financial performance management, as well as to reducing the impact of internal risks on financial performance of the enterprise.

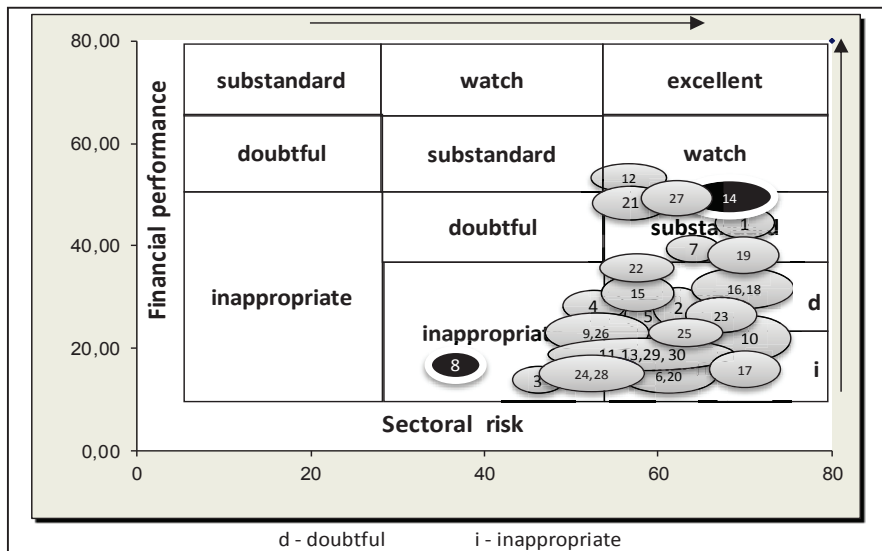


Fig. 1. Creditworthy model.  
Source: Authors

Results of businesses in financial performance and risks are graphically represented by the application of Creditworthy model (see Figure 1). In this model businesses are located in the position of low performance and low risk. This implies that analyzed industry is one of the less risky sectors; it does not use its opportunities and strengths to increase financial performance. Majority of enterprises occurs in the positions “inappropriate” and “doubtful”. Companies no. 7, 1 and 19 are located in position “substandard” and companies no. 21, 27, 14 and 12 are situated in position “watch”. So we can say that from the total number of 30 businesses, four businesses achieve almost average results and four businesses are able to achieve above average results. However none of the analyzed businesses achieved position “excellent”. To obtain this position businesses have to improve profitability and shorten Turn around Receivables, some of them also have to increase Current Ratio and according to individual requirements they have to improve selected financial indicators. Regarding the risks, all businesses have Risk Premium for lower stocks liquidity in the market at the level of 5%, but in this case we can state the inadequacy of the value of determined criteria for the Slovak conditions. In relation to low Current Ratio several businesses obtained Risk Premium for financial risk. Despite the low profitability only one business obtained Risk Premium for business risk.

**4. Conclusion**

In the light of above mentioned, we can conclude that in the case of indicators Return on Equity, Return on Assets, Return on Sales, Assets Turnover, Current Ratio, Interest Coverage and Turn around Liabilities we reject the null hypothesis  $H_{01}$  stating there is no statistically significant linear relationship between these measures and the EVA indicator in favor of the alternative hypothesis  $H_{11}$ . Based on the correlation matrix we suggest these indicators

as key performance indicators for chosen industry. Regarding the other indicators in case of which the correlation dependences between them and the EVA indicator are not marked by software Statistica, we fail to reject the null hypothesis  $H_{01}$ .

Finally we can conclude that conventional financial indicators are not sufficient for effective performance measurement, we need to use also modern performance indicators such as the EVA indicator. Based on the correlation matrix we can say that analyzed enterprises need to use above mentioned key performance indicators to make performance management more sophisticated.

Based on the results of Creditworthy model for given industry we can conclude that profitability, which negatively affects financial performance, is not such low to constitute a risk for given sector. The risk is liquidity and related activity that businesses have to deal with. Equally risky is the capital structure but it is risky mainly in terms of highly set risk criteria for Slovak conditions.

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