THE APPLICATION OF THE BANKRUPTCY MODELS IN THE CONDITIONS OF SELECTED COMPANIES

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Abstract

This article deals with an issue of evaluation of economic results of companies within HIT cluster. The aim of this evaluation is to verify the hypothesis that the membership in the cluster has an impact on the economic results in comparison with the average results in the industry sector. Hradec IT cluster (HIT cluster) was established on 8th October 2008 in the industry sector called information technology (according to the classification of economic activities). For the verification of the presented hypothesis the bankruptcy model Altman Z-score has been used. The results for each company have been calculated based on the data available in the database Albertina; these results have been subsequently compared with average results in information technology sector. These average results have been calculated based on the data available from the Ministry of Industry and Trade (MIT). The compared period of time is 2009 – 2011, because for this period the data were available in both databases (Albertina and database of MIT) in the moment of creation of this article. Most of analysed companies have achieved better results than the average results in the IT sector. A more detailed analysis is described within this article.

Key words: Altman Z-score, bankruptcy model, HIT cluster, financial health.

JEL Code: G33, M41

Introduction

It is well known that the basic aim of every business entity is to achieve profit as a positive difference between revenues and expenses. However, business life of every entity is far more complicated and there are lots of different tools for measuring and improving the economic results of the company.

Financial analysis is one of the most important tools for evaluating financial health of a business entity. It is possible to use different approaches, methods, and calculations within the financial analysis, but with the same aim. This aim is to measure and verify economic

results of a company from different points of view and to provide better information for decision makers.[1]

Another well-known fact is the existence of clusters. Clusters exist all around the world, but in the conditions of the Czech Republic have been established in the last few years. Cluster could be defined as a geographical location where enough resources and competences amass reach a critical threshold, giving it a key position in a given economic branch of activity, and with a decisive sustainable competitive advantage over other places, or even a world supremacy in that field. Such competitive advantage could be found in different areas of business life of every member; however, one of the expected results of the membership is the improvement of economic results.

The aim of this article is to verify the hypothesis that the membership in Hradec IT Cluster (HIT Cluster) has improved the economic results of the members. One of the bankruptcy models, specifically Altman Z-score, has been selected for the verification of this hypothesis, while the results of the member companies are compared with the average results from the information technology industry sector. The data for calculations have been searched in the database Albertina and in the database available on Ministry of Industry and Trade.

1 Methodology

The basic terms, such as financial analysis, Altman Z-score, and cluster, will be described in this chapter. The author will use these terms in the following part of the article.

1.1 Financial Analysis

As mentioned above, the basic aim of financial analysis is to evaluate financial health of business entity. A lot of different methods can be used within financial analysis.

Analysis of financial statements (percentage analysis) helps to evaluate the structure or development of balance sheet (assets on one side and owner's equity and liabilities on the other side) and the structure or development of income statement (revenues and expenses). It can be done as vertical analysis, which means recalculation of appropriate financial statement into percentage. Such recalculated statement could be subsequently compared in time, with

[1] For more information, Agarwal, V., & Taffler, R. (). Comparing the performance of market-based and accounting-based bankruptcy prediction models. *Journal of Banking & Finance, 32*, 1541-1551.

other business entities, with recommended results, or with average results from industry sector.[2]

The calculation of different indicators is another favourite method of financial analysis. Five different groups of ratios are usually calculated, namely profitability ratios, liquidity ratios, asset turnover ratios, financial leverage ratios, and dividend policy ratios. There could be calculated many different indicators in every group, while these indicators usually have a recommended value.

Moreover, it is possible to calculate some complex indicators too. There are two main groups of these complex indicators, bankruptcy models and credibility models. These models usually combine several ratios with different weight and final result is compared with recommended results.[3]

One of the most favourite bankruptcy models is Altman Z-score, called after Professor Edward Altman. Several variants of this model exist according to the type of business entity. Z-score for private companies could be calculated as follows:

$$Z = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5, \qquad (1)$$

where:

- T_1 = (current assets – current liabilities) / total assets
- T_2 = retained earnings / total assets
- T_3 = earnings before interest and taxes / total assets
- T_4 = book value of equity / total liabilities
- T_5 = sales / total assets[4]

Zones of discrimination of this model are 2.9 and 1.23. If the result of Z is more than 2.9, the company is in the "safe zone" and there is no significant risk of bankruptcy. If the result is between 1.23 and 2.9, the company is in the "grey zone", which means some risk of bankruptcy for such company and necessity to make some decisions for improving the situation. Moreover, an analysis of each T_i can reveal the most problematic indicator of such

[2] For more information, Altman, E. I., & Kalotay, E. A. (). Ultimate recovery mixtures. *Journal of Banking & Finance, 40,* 116-129.

[3] For more information, Craciun, M., Ratiu, C., Bucerzan, D., & Manolescu, A. (). Actuality of Bankruptcy Prediction Models used in Decision Support System. *International Journal of Computers Communications & Control, 8,* 375-383.

[4] For more information, Altman, E. I., Hartzell, J., & Peck, M. A. (). An emerging market credit scoring system for corporate bonds. *Emerging Markets Review, 2,* 391-400.

company. If the result is below 1.23, the company is in the "distress zone" and it will probably bankrupt.[5]

1.2 Characteristics of the Cluster

As mentioned above, cluster is a geographical location of different subjects, especially private companies, but also public organizations, suppliers, banks and other subjects, where all of these subjects are able to create competitive advantage thanks to the membership.[6]

Contribution of membership in the cluster can be found in different areas, such as planning, organization and project management; production; human resources management; finance; logistics; marketing and sales; research and development, etc.[7]

In other words, the membership in the cluster can improve different areas of business entity. Therefore, either revenues can increase, or expenses can decrease. Eventually, all of these effects can be seen in the increase of the net income which can be found in the improvement of different financial analysis indicators.[8][9]

HIT cluster was established on 8th October 2008. There are sixteen members these days, namely:

- AG COM, joint-stock company,
- ALTEC, joint-stock company,
- DERS, ltd.,
- FG Forrest, joint-stock company,
- GIST, ltd.,
- ORTEX, ltd.,
- T-MAPY, ltd.,
- University of Hradec Králové,
- CSF, ltd.,

[5] For more information, Altman, E. I., Yen, J., & Zhang, L. (). Corporate financial distress diagnosis model and application in credit rating for listing firms in China. *Frontiers of Computer Science in China, 4,* 220-236.

[6] For more information, Kovarnik, J. (). Klastrové iniciativy v podmínkách rozšiřující se Evropské unie. *Scientific papers of the University of Pardubice Series D, 11,* 1-6.

[7] For more information, Kovarnik, J., & Stejskal, J. (). Klastry jako nástroj regionálního inovačního profilu. *Scientific Papers of the University Pardubice Special Series, 1,* 52-56.

[8] For more information, Todtling, F., Skokan, K., Hoglinger, C., Rumpel, P. & Grillitsch, M. (). Innovation and knowledge sourcing of modern sectors in old industrial regions: comparing software firms in Moravia-Silesia and Upper Austria. *European urban and regional studies, 20,* 188-205.

[9] For more information, Stejskal, J., & Hajek, P. (). Competitive Advantage Analysis: A Novel Method for Industrial Clusters Identification. Journal of business economics and management, 13, 344-365.

- MF SERVIS, ltd.,
- Koncept Hradec Králové, ltd.,
- GMC Software Technology, ltd.,
- Technologic Center Hradec Králové, public benefit corporation,
- High School and College of Applied Cybernetics, ltd.,
- UNI-EPOS, ltd.,
- MEDISYSTEMS, joint-stock company.

University of Hradec Králové is a public university; therefore there is no aim to create net income. The other members are private business entities and these institutions have been analysed in this article.

1.3 The Aim and the Methodology

As mentioned above, the basic aim of this article is to verify the hypothesis that the membership in the cluster has improved the financial situation of analysed companies. The members (private companies) of HIT cluster have been selected for the verification of this hypothesis, and the Altman Z-score has been used for the calculation as a complex indicator of financial health.[10]

The data for the calculations are available in Albertina database. These data are compared with the average results from the industry sector information technology. These average results are available in the database prepared by the Ministry of Industry and Trade. The analysed period is from 2009 to 2011, because for this period the data were available in both databases in the moment of creation of this article.

2 The Financial Analysis of Selected Companies

In the following Tab. 1 are final results of Altman Z-score for above mentioned companies in the years 2009, 2010, and 2011.

Tab. 1: Final Results of Altman Z-score

Company	2009	2010	2011
AG COM	2.088	2.209	1.595
ALTEC	3.659	2.806	2.749

[10] For more information, Pitrova, K. (). Possibilities of the Altman zeta model application to Czech firms. E & M Ekonomie a Management, 14, 66-76.

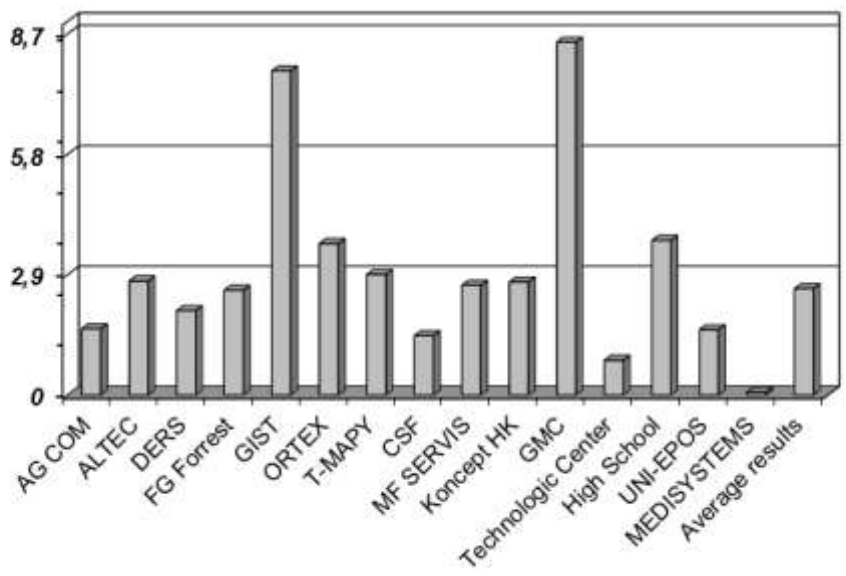
DERS	1.973	2.197	2.035
FG Forrest	2.803	2.736	2.525
GIST	6.256	6.194	7.806
ORTEX	2.458	3.068	3.648
T-MAPY	3.401	3.420	2.905
CSF	1.576	1.466	1.429
MF SERVIS	1.971	3.338	2.644
Koncept Hradec Králové	2.957	2.916	2.724
GMC Software Technology	7.164	8.314	8.503
Technologic Center Hradec Králové	6.049	2.850	0.837
High School and College of Applied Cybernetics	3.754	4.169	3.726
UNI-EPOS	-0.146	-0.228	1.576
MEDISYSTEMS	2.881	0.769	0.070
Average results for information technology sector	2.524	2.565	2.563

Source: own calculations based on Albertina and MIT databases

As mentioned above, zones of discrimination of this model are 2.9 and 1.23. That means that every company with the result higher than 2.9 is in “safe zone”, between 2.9 and 1.23 is “grey zone” and below 1.23 is “distress zone”.

Results for the year 2011 are in following Fig. 1 for better understanding. First point on the y axis is 1.23 that means low zone of discrimination. High zone of discrimination (2.9) is written directly on the axis y.

Fig. 1: Altman Z-score for Selected Members of HIT Cluster in 2011



Source: own calculations based on Albertina and MIT databases

From the data in Tab. 1 it is obvious that the average results in IT sector were in the grey zone in the year 2009, while seven companies were in the safe zone, seven companies in the grey zone, and only one company in the distress zone. However, only two companies in the grey zone had better results than the average result. To sum it up, nine companies had better results than the average IT results in 2009, while six had worse results, from which one company was in the distress zone.

In the year 2010, the average result was in the grey zone again. Seven companies were in the safe zone, six companies were in the grey zone, and two companies were in the distress zone. Moreover, three companies in the grey zone had better results than the average one, while three had worse results. To sum it up, ten companies had better results in 2010, five companies had worse results, but two of them were in the distress zone.

In the year 2011, the average result was almost the same; that means in the grey zone again. Only five companies were in the safe zone, eight of them were in the grey zone, and two companies were in the distress zone. In the grey zone, five companies had worse results than the average IT results, while three companies achieved better results. To sum it up, eight companies had better results than the average one in 2011, seven companies had worse results, and two of them were in the distress zone.

The results for each T_i of Altman Z-score in the year 2011 are described in the following Tab. 2.

Tab. 2: Indicators of Altman Z-score for selected companies in 2011

Company	T_1	T_2	T_3	T_4	T_5
AG COM	0.571	0.041	0.053	0.389	0.825
ALTEC	0.371	0.015	0.002	0.442	1.052
DERS	0.004	0.122	0.158	0.705	1.144
FG Forrest	0.509	0.031	0.041	1.836	1.239
GIST	0.572	0.122	0.135	15.319	0.439
ORTEX	0.338	0.032	0.040	3.834	1.645
T-MAPY	0.372	0.021	0.027	2.607	1.446
CSF	0.262	-0.001	0.002	0.442	1.052
MF SERVIS	0.421	0.234	0.289	1.677	0.543
Koncept Hradec Králové	0.775	0.000	0.002	0.007	2.165
GMC Software Technology	0.081	0.061	0.087	0.222	8.045
Technologic Center Hradec Králové	0.710	-0.031	-0.027	0.060	0.409
High School of Applied Cybernetics	0.641	0.047	0.059	2.694	1.916
UNI-EPOS	1.000	0.133	0.133	0.092	0.294
MEDISYSTEMS	-0.292	-0.066	-0.066	1.223	0.028
Average results for IT sector	0.304	0.247	0.135	1.302	1.170

Source: own calculations based on Albertina and MIT databases

This deeper analysis in the Tab. 2 brings very interesting results. Even though seven companies were overall better than the average result, in the terms of T_1 ((current assets – current liabilities) / total assets) eleven companies were better. However, one company had a negative result of this indicator, which suggests high share of current liabilities and possible problems with liquidity in this company. On the other hand, regarding T_2 (retained earnings / total assets) none of analysed companies was better than the average result. The possible explanation could be that analysed companies are usually paying shares to owners rather than re-investing the net income. Moreover, three companies had negative results which mean loss from the previous years. In terms of T_3 (earnings before interest and taxes / total assets), only two companies were better than the average result, which means even current net income compared with the total assets was lower than the average net income for thirteen of analysed companies. Two companies had current loss (negative T_3). Regarding T_4 (book value of equity / total liabilities) six companies achieved better than average results. Moreover, this indicator was really high in one company (more than 15), which means a really low share of

liabilities. On one hand, such result is good considering the liquidity. On the other hand, it could be considered wrong with respect to the leverage. Final indicator T_5 (sales / total assets) was better for six companies while one of them had a really high share of sales (the result was higher than 8).

To sum it up, final Z-score was higher for seven companies especially because of T_1 or because of exceptionally high results of T_4 and T_5. The rest of the results are rather mediocre.

Conclusion

This article deals with the issue of application of bankruptcy models, specifically Altman Z-score, in selected companies. The aim was the verification of the hypothesis that membership in Hradec IT Cluster (HIT Cluster) has improved the economic results of its members. This verification was made by comparison of results of Altman Z-score for the members of HIT cluster with the average results in IT sector.

The average results of IT sector were in the grey zone of Altman Z-score in all three analysed years, while major part of members achieved better results (safety zone or better results in the grey zone). This could indicate that the membership has really improved economic results and financial health of the HIT cluster members and the hypothesis is verified.

However, the results of deep analysis of each of the indicators of Altman Z-score were completely different. The only higher than average indicator was T_1 ((current assets – current liabilities) / total assets) while the other indicators were mostly below average. There were some extraordinary exceptions in some cases (T_4 higher than 15 or T_5 higher than 8), but the majority of the other indicators was below average.

Therefore, it is possible to make a conclusion that the membership in the cluster probably has helped to avoid bankruptcy in analysed companies, but there are not any significant improvements in financial health of analysed companies. The membership in the cluster is probably beneficial for the members because of the other reasons, like the improvement of mutual cooperation, supplier-customer relationships, cooperation in the area of research and development, etc. The hypothesis about the improvement of indicators of financial health has to be denied.

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