Position of the chosen industrial companies in connection to the mining

***Eva Manová*[1], *Katarína Čulková*[2], *Jozef Lukáč*[1], *Jana Simonidesová*[1] *and* *Zuzana Kudlová*[1]**

Mining is connected with various industrial sectors. Especially mining and metallurgy present one of the most important sectors in some countries, presenting contribution to the state economy. Therefore, its position is greatly influenced by the position of the connected industrial companies, mainly metallurgy and metal production. On the other hand, the ability of the company to develop and introduce its activity to the market depends on its financial performance. The goal of the contribution is to evaluate the position of 50 chosen industrial companies in Slovakia from the view of chosen performance and indebtedness indexes. Similarly, we analyse the size categories and position of the companies in the area of restructuring, liquidation and payment orders. The analysis had been made by statistic program R that is proper for the creation of statistic models and data analysis. The result of the evaluation in the contribution presents cluster analysis, through which we determine companies' clusters from chosen sectors according to chosen financial indexes. The results confirm the position of the analysed companies in the frame of the sector is satisfactory. Improvement of the economic activity of industrial companies determines conditions for the possible improvement of mining and metallurgical business activity and finds the sources of companies' growth.

Keywords: *mining, industrial companies, metallurgy, financial performance, Slovakia*

Introduction

One of the most significant factors, influencing industrial companies, is the high energy consumption. Thus, energy-saving alternative mining and mineral processing methods are considered to improve the processes economically and environmentally (Kamradt et al., 2018). As for the connection of mining and metallurgical industry, there is necessary to do multi-disciplinary research to develop a concept of ores mining and its using in metallurgical production. Such a concept had been developed by Kamradt et al. (2012) for the recovery of base and trace metals from the bearing dumps. The concept can combine resource-efficient use in mineral processing and sustainable utilisation of mines. Presently industrial companies need to improve their competitive power for optimum allocation of their resources and stimulation of the growth in the market.

An integral competitive power indicator for companies and industries provides a basis for creating a monitoring database of competitive power ratings for industries, enhancing transparency of national companies' success, as compared with similar foreign industrial companies and governmental support of the best companies on a competitive basis (Danilová and Karetniková, 2016). Improvement of the economic activity of industrial enterprises implies the development of new methods, forms and mechanisms of creating and mastering of new competitive products designed to ensure the predominant position of enterprises on domestic and foreign markets. It appears that in contemporary entrepreneurial environment industrial enterprises that are able to realise regular and targeted changes survives. Therefore, the ability of the company to develop and introduce to the market its new product depends on its financial performance (Kulikova et al., 2016). These changes or innovations are implemented not only for survival but also for gaining significant market position. Innovation is supposed to be the creative destruction of current status, and a tool to enhance long-term competitiveness and necessary condition for a successful business (Peterková and Ludvík, 2015).

Industrial companies must achieve continuous improvement in all areas of business when financial improvement had special effects on company improvement (Gumerov et al., 2015). The purpose of the paper is to determine conditions for the possible improvement of mining and metallurgical enterprises activity of the business and find the source of their growth. Mining and metallurgical companies have an irreplaceable task in the country economy – in the creation of working posts, the flexibility of the market mechanism and the creation of value added.

State of the problems

The mining and metallurgy present one of the important sectors in some countries. It has its strategic importance and plays a pivotal role in influencing the economy of the country (Karthick and Kasthuri, 2015). The mining industry is closely connected with other industrial sectors, especially metallurgy. Both industries are very similar, for example, due to the generation of residues (Cruz-Hernández et al., 2018). It is alarming that

[1] *Eva Manová, Jozef Lukáč, Jana Simonidesová, Zuzana Kudlová*, Faculty of Business Economics of the University of Economics in Bratislava with seat in Košice, Tajovského 13, 040 01 Košice, Slovakia, eva.manova@euke.sk, jozef.lukac@student.euke.sk, jana.simonidesova@euke.sk, zuzana.kudlova@euke.sk

[2] *Katarína Čulková,* Technical University in Košice, Faculty BERG, Letná 9, 040 01 Košice, Slovakia, katarina.culkova@tuke.sk

waste from mining and metallurgy presents an opportunity for integrated economic development, particularly in the recycling sector. In this area, Mulopo (2015) investigates the recovery of water and the selective removal of valuable metals from acid mine drainage (AMD) using sulfidation media (CaS) derived from waste gypsum. The major problem has always been that the mining sector generates a large number of waste streams which show strong differences in time. Also, Muravyov et al. (2014) investigated the process for the recovery of copper and zinc from mining and metallurgical wastes. The work is a perspective and a promising technique for the complex treatment of mining and metallurgical wastes. Some materials, produced in metallurgy, are used in mining (Malewski, 2017; Feroze and Genc, 2016). The desire to reduce the cost of coal mining leads among others to look for new, more cost-effective ways to protect mines. Rotkegel et al. (2013) show that the mine support is more than 60% by weight and material costs. Therefore, the work focused on the search for more efficient mine supports should primarily include high-performance. One task was to develop a new type of mining and metallurgy production, serving especially as economic pillars (Rao et al., 2018). Also, Tost et al. (2018) explore if the current efforts of the largest mining companies are aligned with the efforts of companies from other industry sectors. According to Vilamová et al. (2016), the evaluation of metallurgical organisations will not be based solely on the technical parameters, but also on the criteria affecting the cost of the entire process, including the logistics aspects. In the long run, this concept can bring metallurgical organisations many competitive advantages of use quality quantification model. Kozel et al. (2017) use a Balanced Scorecard, which represents a suitable tool for increasing the competitiveness of industrial companies and It allows measuring the performance of metallurgical companies in a more complex manner.

Metallurgical industry can be divided into the metallurgy of iron and steel – black metallurgy, producing around 95% of metallurgical production whole world. Raw iron is produced in a blast furnace. The iron is processed further to the steel, which means iron alloy (Fe), carbon (C) and small percentage of other elements, as for example aluminium (Al), manganese (Mn), silicon (Si), chrome (Cr) or nickel (Ni) (so-called alloying mixture) that improve physical and chemical characteristics of the steel. Also, iron scrap or waste is used for steel production. The second group presents metallurgy of non-ferrous metals, where production of aluminium (Al) belongs, and tin (Sn), lead (Pb), and nickel (Ni) or mercury (Hg). The elements are negligible due to their content, but due to their importance, there is necessary to consider also with an orientation to the obtaining and processing of precious stones – gold (Au), silver (Ag) and platinum (Pt) (Majerčaková, 1988). Metal production is represented by the iron and steel industry. These industrial sectors are connected with high consumption of material and energies, providing from mining. More than half of the material input presents output by way of waste gas and solid waste – secondary products. The most serious emissions are polluting elements, emitted to the air, while emissions from agglomeration treatments are prevailing. Despite considerable effort to decrease emission, the rate of the sector on whole emissions to the air is in EU considerable at a high number of polluting elements, mainly in case of some heavy metals and PCDD/F. The rate of repeatedly used and recycled solid waste / secondary products had been increased considerably, but noticeable volumes are further stocking at the waste stocks (European Commission, 2014).

Any company that is part of the economy in a given state exists in a specific environment that is influencing the company, which is called the business environment. Presently emphasise is given to the overcoming of a various obstacle in business, as, for example, survival at the market and achievement of appropriate profit. To achieve mentioned goals, there is necessary to create a strategy of the company, at which considerable changes must be accepted in an external and internal environment that force the company to adapt, as well as to improve and innovate its product or service. The assumption for such obstacles overcoming presents a complex financial evaluation of the company position in the economy. The base is to make ex-post and ex-ante analysis according to accounting reports – balance sheet, loss and profit statement and internal documents, informing about some employees, sale and supply activity, etc. There is necessary to mention that the finances of the company are influenced by great number of mentioned internal and external indexes, as, for example, interest rate, accounting method, used in the chosen company. Measuring of performance through financial indexes can be viewed as a system that presents file of indexes, used for quantification of company effectiveness and efficiency of its activity. It can be perceived as a process of reporting, giving feedback to employees according to the results of their activity. From the strategic view, we identify two various aspects of the system for measuring business performance. It reflects process, used during the selection of proper performance measures in the frame of organisation strategy. On the other hand, the system provides information necessary for doubting of importance and strategy applying in the company (Rodrigues, 2018).

Impact of specific property and capital structure of the companies from the sector to the financial health of the company can be extended by the impact of the companies in the living environment. Great importance from this view is given to the production of a considerable volume of waste with various chemical and physical structures (Fazekašová et al., 2015). In the past, the majority of waste had been stocking on the dumps in the immediate surrounding of metallurgical operations without regard to their character and structure, as well as without possibility of their future selective using. Presently, the majority of metallurgical waste is recycled or used in the frame of other industrial sectors. Despite mentioned, there are still wastes that make problems due to

their impossible using. Emissions of metallurgical companies present traditional polluting elements: TZL, SO_2, NO_X a CO. Presently, the attention is given to the pollution by heavy and other metals, as, for example, arsenic, mercury, lead, chromium and cadmium, which contaminate not only surrounding of the companies but mainly soil fond. Similar problems are in the area of establishment of Technological Knowledge Intensive Business Services - (T KIBS) in the company from the area of mineral water wells had been evaluated by Ferencz et al. (2015), presenting very simple and purpose build model for T KIBS implementation. The approach decreases the costs considerably on T KIBS implementation in practice, and the company obtains qualified top specialists and developers for relatively low cost during the necessary period. In the end, the implementation of the model influences positively financial health of the company due to the cost decreasing and profit increasing from the area of mineral water wells in Slovakia.

Methodology and data

The goal of the contribution is a detailed analysis of the position of 50 biggest companies through achieved profit in the area of metal production and metallurgy in 2016. For the achievement of the main goal, basic general logical methods were used – analysis, synthesis, comparing, induction, deduction and selection. Due to the detailed analysis and detail explanation of results, statistical methods are used, based on analysis by Pearson correlation coefficient. The analysis is made in statistic program R that is convenient for creation of statistic models, data analysis and graphical analysis of data.

The analysed sample presents a selection of biggest companies from the view of achieved profit in sector Metal production and Metallurgy. According to economic structure SK NACE, companies in the sector deal with the following activities:

- Forging, stamping, stamping and rolling of metals; powder metallurgy [25500],
- Cultivation [25620],
- Casting of light metals [24530],
- Casting of other non-ferrous metals [24540],
- Iron casting [24510],
- Processing and surface metal treatment [25610],
- Wire drawing cold [24340],
- Cold forming or cold storage [24330],
- Production of wire products, chains and springs [25930],
- Aluminum production [24420],
- Production of metal constructions [25110],
- Packages production from light metals [25920],
- Production of steam boiler except for boilers for central heating [25300],
- Production of radiators and boilers for central heating [25210],
- Production of pipelines, hollow profiles, and related accessories from steel [24200],
- Production of raw iron and steel and ferry-alloy [24100],
- Locks and hinges production [25720].

Figure 1 illustrates analysed companies, structured according to size categories. This provides one of the basic information about the companies. Further, we considered the number of employees, operation in the frame of the region, but we defined chosen companies also from the view of debt, restructuring, ownership, payment order and liquidation.

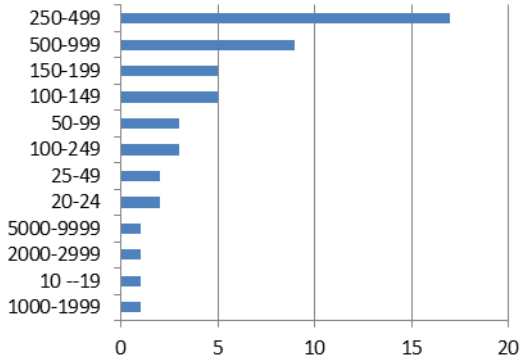

Fig. 1. Companies, employed majority of the employees according to size category
Source: own processing according to companies database.

According to the document of Ministry of Economy in Slovakia (2017) „Characteristics of metal and metal production in Slovakia in 2015-2016“, the sector records proven decrease of sales, which caused also decreasing of employees. Production of raw iron and steel and ferry-alloy (SK NACE 241) in 7 companies had been provided by 11 063 employees (annual decrease by 5,2 %), in the first half of 2016 10 996 employees had been working (annual decrease by 2,4 %); and in three quarters in 2016 average recorded number of employees was 10 985 (annual decrease by 1,5 %). By the end of the year, we recorded an average number of employees at level 10 955, presenting according to annual comparing decrease by 0,98 %. Production of pipelines, hollow profiles and accessories from steel (SK NACE 242) in 7 companies had been provided by 3 519 employees (annual decrease by 2,2 %), in first half it was 3 471 persons (annual decrease by 5 %) and in three quarters in 2016 average recorded number of employees was 3 524 (annual decrease by 4,1 %); to the end 2016 average recorded number of employees was 3 523 (annual decrease by 0,10 %).

In production of other products during first steel processing (SK NACE 243) - in 12 companies 2203 employees worked (annual growth by 12 %), in first half of the year the number presented 2 160 persons (annual growth by 0,5 %) and in three quarters in 2016 the average number of employees was 2 156 (annual decrease by 1,6 %), to the end of the year the average number of employees presented 2 169 (annual growth by 1,6 %). A similar development can be shown by rates of the companies according to the individual county in Slovakia, illustrated by Figure 2.

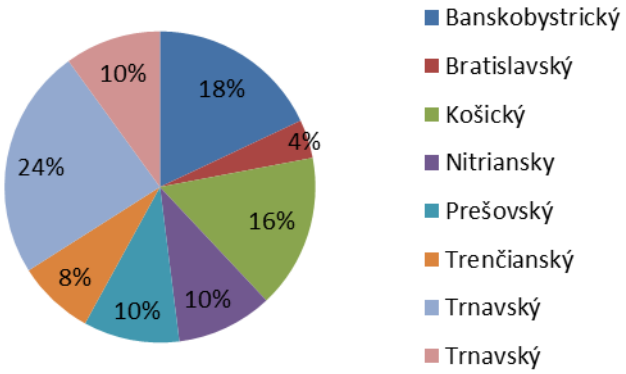

Fig. 2. Percentage rates of the metallurgical companies according to the individual county in Slovakia
Source: own processing according to companies database.

From the view of ownership, companies present in 27 cases foreign ownership, private domestic ownership is presenting by 8 companies, and 13 companies are ranked to the international private ownership. Table 1 follows chosen indexes from a legal view as, for example, restructuring, payment orders and liquidation. Due to the holding of economic growth and providing of stable financial performance company can use, for example, a restructuring that presents important attribute of whole business sphere transforming. The need of restructuring means first of all decision of its implementation, but it is also closely connected with the effectiveness of economic activity in given economic environment that could influence payment orders, liquidation of the company or its indebtedness.

Tab. 1. Review of chosen indexes from the legal view

	Yes	*No*
Debts	*2*	*48*
Restructuring	*Terminated restructuring*	*49*
Payment orders	*12*	*38*
Cancellation	*0*	*50*
Liquidation	*0*	*50*

Source: own processing according to companies database

Data show that 48 companies do not record any debts against social and health insurance authorities or other state administration. On the other hand, two companies record the debts. In the case of one company, the restructuring terminated in 2016 and other companies do not have any problems in the legal area. In the research we dealt with chosen indexes of performance – ROE – return on equity, debt / EBITDA (earnings before interest, taxes and depreciation), profit margin, total indebtedness, net debt, but also flow indicators, obtained from financial reports of chosen companies, mainly equity, sales, profit and value added.

Results

Table 2 presents basic descriptive statistics of chosen financial indexes as, for example, average, standard deviation, median, minimum and maximum. The statistics can describe qualitative and quantitative characteristics of the searching sample. Descriptive data statistics is necessary mainly for relations analysis through the Pearson correlation coefficient.

Tab. 2. Descriptive statistics of chosen financial indexes.

	average	*standard deviation*	*minimum*	*maximum*	*median*
ROE	*18,1*	*45,7*	*-123,0*	*239,4*	*14,3*
Debt/EBITDA	*-4,4*	*35,4*	*-197,8*	*9,4*	*0,9*
Profit margin	*4,7*	*12,4*	*-65,5*	*42,7*	*4,2*
Equity	*48991785,3*	*167199895,4*	*-17605788,0*	*1173044000,0*	*12363939,0*
Total indebtedness	*65,9*	*38,2*	*16,5*	*210,1*	*63,5*
Sales	*115626400,9*	*285796685,5*	*23803592,0*	*2034734000,0*	*43061754,5*
Profit	*9680067,5*	*38219519,4*	*-15770571,0*	*270514000,0*	*1791221,0*
Value added	*27935071,9*	*94653521,1*	*530774,0*	*678766000,0*	*8881440,5*
EBITDA	*11453543,0*	*33415931,3*	*-11813318,0*	*228839000,0*	*3996170,0*
EBITDA margin	*7,9*	*12,3*	*-49,1*	*29,2*	*8,2*
Net debt	*856670,5*	*24691823,3*	*-123128000,0*	*76474777,0*	*-57208,0*
Net debt/EBITDA	*-3,6*	*27,7*	*-196,4*	*7,6*	*-0,1*

Source: own processing according to the database of companies

Table 2 shows various disproportions between financial indexes. As for ROE, there is the difference between the minimal and maximal value of the indexes – while company with the worst ROE – negative 123 % (the company is illiquid), company with the highest liquidity managed to evaluate equity by 239, 4 %. In average, analysed companies achieve values of equity, sales, value added at the level of positive numbers.

Subsequently, we used the method of the cluster, dividing companies into clusters according to the similarity of the indexes and at the same time according to the characteristics of other clusters indexes. According to chosen financial indexes, we can rank companies to individual clusters that have similar characteristics and that are different from companies' characteristics in other clusters. During the process, we used the Ward method, while due to the determination of similarity Euclidean distance had been used. The statistical analysis had been done in program R that is appropriate for the creation of statistic models and data analysis, and it is convenient for creation of graphical data analysis. However, due to the cluster analysis, there is necessary to exclude statistically important, but weaker dependences, since they could distort the result of cluster analysis. Figure 3 illustrates for example that for debt/EBITDA, equity, net debt, net debt/EBITDA, all coefficients are statistically unimportant.

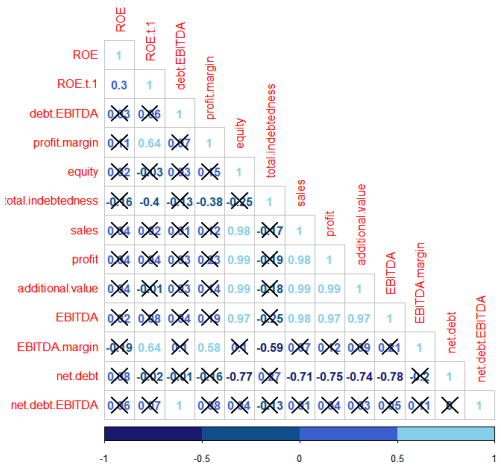

Fig. 3. Analysis of relations by Spearman correlation coefficient
Source: own processing in R program.

For EBITDA indexes and additional value, some of their mutual correlations are statistically important at the level with 0, 05 importance. It means there could be a problem to create clusters in cluster analysis. Therefore, there is necessary to use analysis of main components. Consequently, there is necessary to determine how many components must be in former financial indexes. According to the screen plot of main components and variance of original data, we determined 6 main components that explain 95, 83 % of original data variance (Fig. 4).

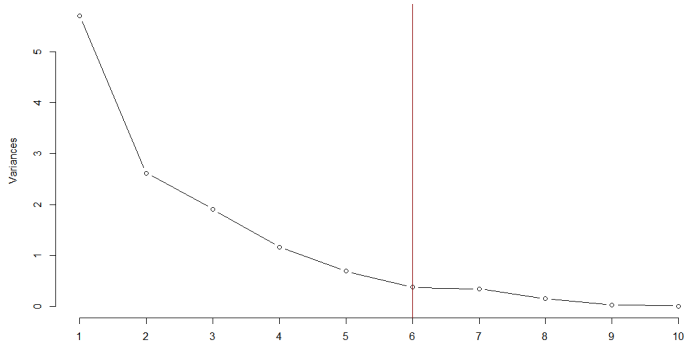

Fig. 4. Screen plot of main components
Source: own processing in R program.

The further process presented a selection of some companies' clusters in the analysis. According to the heuristic approach, we divided file to 8 clusters. However, we resulted also from previous Screen plot, where x-axis illustrates the number of clusters and y-axis presents an internal cluster by the sum of squares. Decisive criteria are minimising of internal cluster sum of squares, presenting optimal state (Fig. 5).

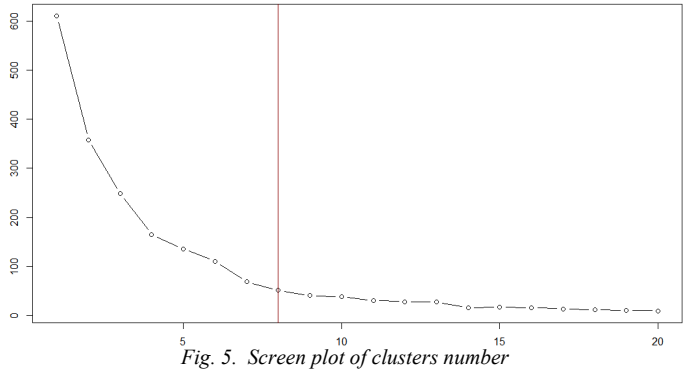

Fig. 5. Screen plot of clusters number
Source: own processing in R program.

Consequently, clusters had been illustrated in a hierarchic tree, where individual clusters are denoted in Figure 6. Every company is denoted by the number. 8 clusters are created that are mutually heterogeneous, but companies in the frame of its cluster are homogeneous.

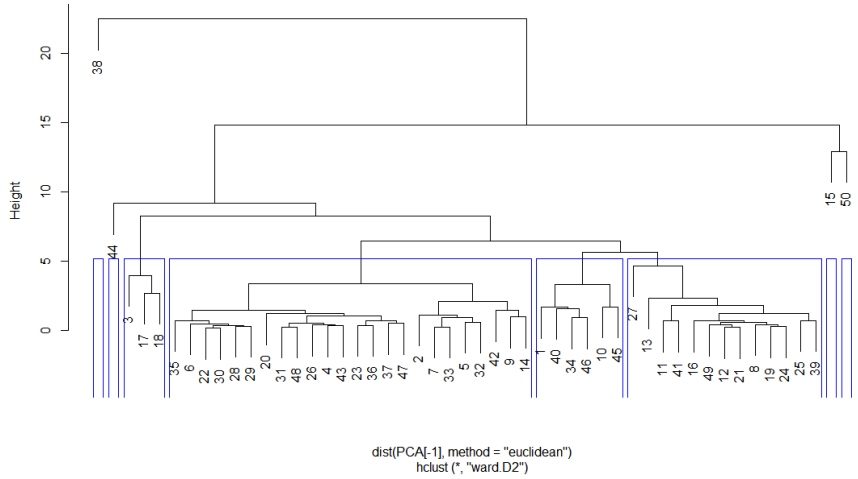

Fig. 6. Hierarchic trees from companies cluster
Source: own processing in R program.

Discussion

Results of the analysis present clusters of companies. We can see there are 8 clusters, where 4 clusters consist of one company, 4 clusters consist 3,6,13 and 24 companies from the area of metal production and metallurgy. Some companies in clusters influenced chosen financial indexes. Alone companies in clusters present result of extreme values of financial performance against other comparing companies. However, the prevailing part of companies creates numerous clusters that are similar to the view of their financial indexes. Table 3 presents centroids (averages) from created clusters of companies. Average values of financial indexes from most numerous clusters are denoted by yellow colour (Tab. 3).

Tab. 3. Centroids of created clusters.

Group.1	ROE	ROE.t.1	debt.EBITDA	profit.margin	equity
1	56.54254	56.438000	0.1349862	10.938175	32820567
2	10.93964	13.193304	2.7897279	2.263540	12804782
3	-69.98098	0.000000	0.0426860	14.725469	-10783589
4	16.34484	12.074063	0.1726122	8.136488	62734915
5	0.00000	0.000000	-197.8250000	-2.452580	-371247
6	23.06086	4.597856	0.0000000	13.409900	1170000000
7	239.42430	-0.510190	-2.6682300	18.134420	2397000
8	0.00000	-146.129000	-1.0048400	-65.541400	-13000000

	total.indebtedness	sales	profit	additional.value
1	64.60291	143173582	11783730	31769087
2	66.47627	58131985	1142263	8449175
3	157.06320	36065447	5239866	2482800
4	30.82524	94977951	8612935	23206401
5	101.37140	93518613	-2283486	5184351
6	33.88400	2030000000	271000000	679000000
7	95.53665	31647000	5739000	8913000
8	210.11150	24255900	-16000000	1363912

Source: own processing in R program.

Average index ROE in 2016 presents 16, 34 %, in the previous year it was 12, 07 %. Value of equity is over 62 million Euro, sales almost 95 million Euro and profit achieved average value 8, 6 million Eur. Generally, the financial situation of the companies in the analysed area is sufficient, not only from the view of the analysed indexes but also from the view of the number of restructuring, payment orders, debts and liquidations.

Summary

During the recent economic crisis and the recovery period, there is a need to study the position of the companies that contribute to economic growth. Many studies attempted to understand the contribution of individual sectors to the state economy. Such studies express the situation in individual sectors, reaction to the crisis and geopolitical situation in single Europe. There is space to deal also with other sectors, connected with mining, as well as to study the influence of a single mining sector to other industries. Affect the financial health of the mining enterprise may also affect the various legislative and technical changes. According to Mikoláš (2015), the implementation of brown coal mining beyond the existing TEL together with the use of clean coal technologies and renewable energy solutions programs, including energy savings can provide a stable fuel and energy balance of the Czech Republic until at least the year 2060, if the reserves at Bilina and CSA open-cast (II. phase) will be used. If the resources from the CSA open-cast are also used in the III. and IV. phase, the balance is secured beyond the horizon of the year 2100.

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