GOSPODARKA SUROWCAMI MINERALNYMI – MINERAL RESOURCES MANAGEMENT

2020 Volume 36 Issue 2 Pages 127–152

DOI: 10.24425/gsm.2020.132565

EUGENIUSZ JACEK SOBCZYK[1], JAROSŁAW KACZMAREK[2],
KAMIL FIJOREK[3], MICHAŁ KOPACZ[4]

Efficiency and financial standing of coal mining enterprises in Poland in terms of restructuring course and effects

Introduction

Economic efficiency can be considered the best expression of management rationality effects, and entrepreneurship is an effective way to achieve that. Those categories are aimed at the achievement of an enterprise operation goals, with the imperative goal of its development. The way of expressing efficiency reflects its measurement. It is a static–dynamic measurement, using value measures, and providing the basis for economic calculation of operation efficiency, as well as for the economic and financial analyses of the enterprise – its condition and results (Osbert 2007; Dudycz 2002).

✉ Corresponding Author: Eugeniusz Jacek Sobczyk; e-mail: jsobczyk@min-pan.krakow.pl
[1] Mineral and Economy Research Institute, Polish Academy of Sciences, Kraków, Poland; ORCID iD: 0000-0003-3968-2312; e-mail: jsobczyk@min-pan.krakow.pl
[2] Cracow University of Economics, Kraków, Poland; ORCID iD: 0000-0002-2554-814X; e-mail: kaczmarj@uek.krakow.pl
[3] Cracow University of Economics, Kraków, Poland; ORCID iD: 0000-0003-1262-6425; e-mail: kamil.fijorek@uek.krakow.pl
[4] Mineral and Economy Research Institute, Polish Academy of Sciences, Kraków, Poland; ORCID iD: 0000-0001-6475-8206; e-mail: kopacz@meeri.eu

Enterprise development consists in coordinated changes in its subsystems, adopting it to the ever changing environment, and including the introduction of new elements, the improvement of existing elements quality and changing their structure (Pierścionek 1996; Stabryła 1996; Platonoff and Sysko-Romańczuk 2003). It is outlined by a set of conditions that change over time and by a subset of factors that determine the economic space of enterprise development. Conditions (resources, statics) and factors (flows, dynamics) in this set are not considered separately but are complementary and interdependent, and within some limits substitutive (Lange 1965; Chomątowski 1993). Flows represent resource consumption, being a measure of their use that cause development.

Efficiency is the quantitative characteristic of enterprise development – and its imperative (Janasz 2008; Kaczmarek 2018). From a financial perspective, enterprise value creation is considered a universal and comprehensive measure of this enterprise operation (Rappaport 1986; Copeland et al. 2000) – financial benefits for the enterprise owners (internal value creation) and those transmitted to the economic system in the form of added value (Stewart 1994; Cwynar A. and Cwynar W. 2007), a component of GDP (external value creation) (Kaczmarek 2019).

The management process is inherently associated with changes occurring in its course, that are particularly evident in the real sphere (Kornai 1977). Changes in the environment lead the enterprise out of the external and internal equilibrium states (Koźmiński and Obłój 1989), and its survival (Fijorek et al. 2015) and development, as well as the achieved results are determined (Weston and Copeland 1992) by various adaptation and restructuring projects.

Restructuring is a strategy of value growth of the economy (macro approach) and its enterprise sector (micro approach) (Hurry 1993). On the macro level it is one of the elements of the state structural policy. The purpose of enterprise restructuring is a change improving its management rationality and efficiency, considered primarily from the perspective of competitiveness improvement. The effects of restructuring are distributed over time, and above all multidimensional, as well as their evaluation using a series of measures enabling the quantification of the effects of those activities (Gabrusewicz 1999).

The presented context of understanding the efficiency of enterprises and their collectivity (meso–structures) became an incentive to undertake research in the area of one of them – PKD division 5 “Mining of coal and lignite”. The subject of the research, which results are presented in this paper, are the financial condition and results of enterprises, using measures forming a coherent set of features characterizing their financial condition – operation efficiency. The research subject are enterprises operating in mining of solid fossil energy resources – hard coal and lignite. The research covered non-financial enterprises employing over 10 employees, that submitted the obligatory statistical report. It is a full set of enterprises in the framework of public statistics (business entities employing up to 9 employees are surveyed only as a statistical sample). This set is referred to as the source of analyses made for the purposes of research in this paper (GUS Warszawa, Pont Info – Gospodarka SŚiDP).

The purpose of the research is to measure and evaluate their operation efficiency, considered as an attribute of enterprise development, as well as factors describing and determining it. The entire conclusion is placed in the broader context of ongoing numerous processes of restructuring, implemented in the examined industry sector (meso-structure), that vary in terms of type, scope and instruments used. Those processes are the basis for the interpretation of outcomes (condition and results) obtained by enterprises that make up the studied meso-structure. The evaluation of enterprise condition and results was conducted using absolute and relative financial measures, classified into five groups: liquidity, activity, debt, profitability and value creation ratios. The range of measures used results from the availability of numerical data in official statistics. The research covered the period of 2007–2019 (semi-annual periodization) thus gaining a long-term evaluation character. The key findings of the evaluation were collected in the form of conclusions in the summary.

1. Restructuring of mining

The restructuring of the mining industry in Poland is a process of continuous changes lasting for thirty years now. It was initiated by the system transformation after 1989, including the reconstruction of the economy operation mechanisms. Key industries to date, such as mining and metallurgy, had proved to be inefficient in front of market economy requirements. The changes, determined by common free market mechanism, competitiveness and freedom and equality of economic entities framework, covered all aspects of mining activity, including technical and economic.

The lignite mining has not implemented any specific restructuring programs. The remedy processes were mainly related to organizational and ownership changes. Mines and power plants operate as one economic organism, and furthermore, there is no raw material market. The volume of mines production is determined by power plants capacity and the inverse relation is rare. The installed capacity of domestic lignite power plants is over 9,200 MW, which equals to 37% of the capacity of hard coal and lignite power plants. At the moment, however, this capacity exceeds the production capability of mines, which, despite their technical capabilities, cannot increase their production due to the lack of concessions. An open issue in this respect is also the economic efficiency and environmental conditions of investing in lignite mining.

Currently, lignite production is concentrated in five quarrying complexes. The mines in Bełchatów and Turów are part of the PGE Górnictwo i Energetyka Konwencjonalna SA company, while mines in Konin and Adamów are part of ZE PAK SA group. Kopalnia Sieniawa Sp. z o.o. produces relatively small amount of lignite, which is used for heating, thus has no impact on Polish energy sector.

In 2018 the Ministry of Energy developed the ‘Program for lignite mining in Poland’. It covers the period of 2018–2030, with a perspective until 2050 and presents directions of lignite mining development in Poland as well as objectives and actions needed to achieve

them. Lignite resources in currently used deposits allow to maintain a stable level of quarrying and operation of the complexes only until 2030. Without access to new deposits, in 2040–2045 in Poland there will occur a total loss of production capability based on lignite and practical closing down of this industry. The program presents the following three potential scenarios for development in the perspective of 2030–2050:

- non-development scenario, that assumes the use of only those lignite deposits, that mines own or plan to extend the mining licenses for,
- base scenario, that assumes the use of deposits, for which there is a justification to operate until 2030. Those are: Złoczew, Ościsłowo and Gubin 2,
- development scenario, that assumes, given favorable circumstances, the implementation of further deposit projects based on Legnica, Oczkowice and Dęby Szlacheckie deposits.

Definitely greater adjustments were made to hard coal mining that was excessively developed in the previous economic system. The adoption of mining to market conditions proved to be an extremely difficult process. Numerous restructuring programs were created, with the main purpose to make this industry achieve economic efficiency and ability to compete permanently on the open market. To achieve this purpose, it was necessary to achieve a series of partial purposes, the most important of which were the reduction of production costs and the increase in labor productivity. That in consequence required (Paszcza 2010):

- disconnection of mines from the whole non-production sphere, as well as the delegation of some tasks to specialized external entities (outsourcing),
- rationalization (reduction) of employment, dictated by the high, over 50% share of labor costs in total costs,
- adjustment of the volume of coal mining to the volume of domestic demand and economically justified export (excessive coal supply makes it impossible to get prices that cover costs),
- reduction of mine production capacities in order to adapt them to the decreasing coal demand. This meant closing down some of the mines.

The course of the process of adapting Polish hard coal mining to market economy conditions can be conventionally divided into several periods. The scope and intensity of changes in the mining industry followed the subsequent government programs for mining industry restructuring (Sobczyk 2000; Szlązak 2004).

1st period of hard coal mining restructuring – 1990–1992 – independence of mines

In September 1991 the Minister of Industry and Trade introduced a document entitled ‘Program of reforms and restructuring schedules for the energy sector’. In the chapter on mining, it assumed freeing coal prices from January 1992, suspending purpose subsidies, continuing the closure of unprofitable mines and incorporating profit–generating mines into about 10 independent, competing mining companies.

In March 1992 the document ‘Proposals of restructuring programs for hard coal and lignite mining, gas and electric power, heating and liquid fuels industries’ specified that

18 mines would be closed down in 1993–2000. At the same time, the direction of establishing competing coal companies, the necessity to free coal prices and suspend purpose subsidies for mining were continued. Commercialization and subsequent privatization of hard coal mining enterprises were indicated as further planned actions.

2nd period of hard coal mining restructuring – 1993–1995 – consolidation of mines

Restructuring processes implemented in 1993–1995 were carried out under three government programs:

- 'Hard coal mining restructuring in Poland – Implementation of the first stage within the financial possibilities' (March, 1993). It advocated the need to divide the mining restructuring process into three stages,
- 'Program of stopping the hard coal mining industry collapse in Poland in 1993', implemented in the second half of that year,
- 'Hard coal mining industry restructuring – Program for the implementation of the second stage in 1994–1995' (March, 1994).

The third stage, planned for implementation in 1996–2000 was generally aimed at maintaining the profitability of coal companies. The content of this program was supposed to be developed by the end of September 1994. However, it was never developed (Szlązak 2004).

In March 1993 six coal companies (incorporating 49 mines) in the form of sole proprietorships of the Treasury as well as three independent mines were established using the provisions of the Act on ownership transformation of selected state–owned enterprises of special importance for the state economy. In addition, in June 1993 Katowicki Holding Węglowy SA was established, incorporating 11 mines. Apart from the above entities, there were seven mines put into close down before 1993.

3rd period of hard coal mining restructuring – 1996–1997

Restructuring activities in this period originated from the government program 'Hard coal mining – policy of the state and the sector for 1996–2000' and 'Program of adjusting hard coal mining to market economy and international competitiveness conditions' (April 30, 1996).

The above restructuring included almost the complete inhibition of restrictive actions (closing down mines) and undertaking activities focused mainly on technical restructuring, however, without the prior provision of necessary basis for financial situation stabilization.

4th period of hard coal mining restructuring – 1998–2002 – adaptation of coal companies to operate in market economy conditions

The ineffectiveness of the previous program actions, resulting in another avalanche of debt and a drastic deterioration of economic and financial situation, caused the initiation of the most radical, the broadest in scope and the most comprehensive hard coal mining

restructuring program to date in 1998. The program took the form of a document (June 30, 1998) entitled 'Hard coal mining restructuring in Poland in 1998–2002' and 'Correction of the government program Hard coal mining restructuring in Poland in 1998–2002' (December 21, 1999).

In 1998–2002 a total reduction in production capacity of 34.5 million tonnes (i.e. by 25%) was achieved. Mining was terminated in 13 mines fully closed down, and in 10 combined mines some of the previously attached mines (collieries) were closed down. The number of employees decreased by 102.6 thousand, i.e. by 42.2% (including 32.9 thousand in 2000–2002). The main instrument for employment restructuring, importantly taking place in conditions of social peace, was the Mining Social Package, used by 67.0 thousand mining industry employees.

5th period of hard coal mining restructuring – 2003–2006 – achieving profitability and economic efficiency

The ineffectiveness of financial restructuring activities, as well as diminishing possibilities to use simple restructuring instruments, resulted in the need to implement (November 2002) 'Program of hard coal mining restructuring in Poland in 2003–2006 using anti–crisis acts and initiating the privatization of selected mines'. It was corrected (January 2003) due to a strong opposition from the social side (i.a. planned close down of seven mines).

This program constituted the basis for implementing general legal and organizational changes in hard coal mining. At the beginning of 2003 mines of the existing five coal companies were incorporated into one company – Kompania Węglowa SA, that became the largest mining company in Europe. Its rapidly deteriorating situation, mainly in financial terms, brought up the necessity to carry out the debt relief process at the end of the year using the legislation enacted for this purpose. Its scale was incomparable to previous processes – in total PLN 18.1 billion of public liabilities were written off in 2003, with further PLN 2.6 billion covered by deferment and installment repayment.

Besides the debt relief problem, there accreted barriers for effective program implementation, which forced a new attempt to introduce changes (April 2004) included in the document entitled 'Hard coal mining restructuring in 2004–2006 and strategy for 2007–2010'. Poland's accession to the European Union was followed by the preparation of (September 2004) 'Plan of access to hard coal resources in 2004–2006 and the plan of closing down mines in 2004–2007'. This plan resulted directly from the assumptions of previous program and constituted the basic document required by the European Commission for the purposes of notification of public support for hard coal mining.

6th period of hard coal mining restructuring – after 2006

The assessment of actions undertaken after 2006 entitled adopting that year as a turning point marking the end of the implementation of typical restructuring programs using legally permitted and economically justified restructuring instruments.

'Strategy for hard coal mining operation in Poland in 2007–2015' (July 2007) determined the directions for its development, desirable from the state perspective, that should constitute the basis for the strategy development by hard coal producers. That meant a change in the way of understanding and approaching structural changes programming by the economic center.

The privatization process of the first Polish hard coal producer proved to be successful at first. In 2009 LWB Bogdanka SA (the only mine in the Lublin Basin) made its debut on the Warsaw Stock Exchange and it 2011 it was followed by Jastrzębska Spółka Węglowa SA (five mines). Unfortunately, the progressing unfavorable market conditions, poor prospects and the deteriorating economic and financial conditions made the shares of those companies systematically drop over the last two years, approaching the lowest historical levels.

Those unfavorable conditions also forced further organizational and ownership changes, that precede the development of a new program for hard coal mining development. They included the establishment (2016) of Polska Grupa Górnicza (Polish Mining Group) – currently a joint–stock company – on the basis of mines and facilities of Kompania Węglowa SA (three combined mines were created) and incorporated (2017) four mines of Katowicki Holding Węglowy (Report 2018).

In addition to the entities mentioned above, there are currently others operating in hard coal mining: three mining facilities in TAURON Wydobycie SA as well as private entities PG "Silesia" Sp. z o.o., EKO–PLUS Sp. z o.o., ZG "Siltech" Sp. z o.o., Węglokoks Kraj Sp. z. o.o. and Spółka Restrukturyzacji Kopalń SA (managing the close down of five mines).

The latest prepared document 'Program for hard coal mining sector in Poland' (January 2018 including a correction of September 2019) determined the horizon of development directions for hard coal mining development in Poland as well as objectives and actions needed to achieve them by 2030.

Adapting hard coal mining to market conditions proved to be an extremely difficult process. The objectives to reach economic efficiency assumed in subsequent programs were being postponed. The most obvious results achieved of that process were the close downs of mines, the decrease in hard coal production level and the reduction in the number of employees. At the beginning of the transformation period there were 70 mines operating (plus three under construction), their production was 177.4 million tonnes and the average employment was 415.9 thousand employees. As a result of many changes, transformations and the privatization process, hard coal is currently mined in 21 mines, mostly multi-collieries. In 2019, 61.6 million tonnes were produced, with 83.3 thousand employees.

As the effects of restructuring processes are distributed over time, this paper presents a detailed analysis of financial results in 2007–2019. The selected period refers to the evaluation of mining companies operation after the completion of specific restructuring programs that were addressed to them.

2. Methods of research

Under PKD Section B "Mining and quarrying", Division 5, there are enterprises dealing with the extraction of solid fossil energy materials, classified into groups: 05.1 – Mining of hard coal and 05.2 – Mining of lignite. The share of the former is dominant, both in terms of employees (95.9%), total assets (96.6%), sales revenues (96.7%) and net financial result (99.5%), which means that the resources and results of the whole PKD Division 5 is determined by hard coal mining enterprises (the principles of statistical confidentiality prevent access to the extracted data and a separate analysis of those enterprises distinguished by type of coal they mine).

The evaluation of the potential and financial results (first stage) of the examined enterprises addressed the following categories (these measures are widely known, defined as standards, and being widely described in the available literature, are not explained in detail in this paper):

- resources: fixed and total assets, accumulated depreciation, inventories, receivables, short-term liabilities, number of employees, net working capital (difference between current assets – inventories, short-term receivables and investments – and short-term liabilities),
- flows: sales revenues, costs, net financial result, investment expenditures, depreciation, export sales,
- rates of use: labor effectiveness (relation of sales revenues to the number of employees), labor productivity (relation of sales revenues to labor costs), asset renewal (relation of investment expenditures to depreciation).

The second stage involved the use of relative measures (ratios) belonging to six main groups (see e.g. Block and Hirt 1987; Higgins 1989; Waśniewski and Skoczylas 2004; Bednarski 2007; Gabrusewicz 2014; Jerzemowska ed. 2018):

- general financial situation: GFSR – relation of capital structure ratio (CSR – relation of equity to debt) to asset structure ratio (ASR – relation of fixed assets to current assets), expressing the compliance with the "financial golden rule" (GFSR value equal to one),
- debt: STDR – short-term debt ratio (relation of short-term liabilities to assets – in manufacturing enterprises should be lower than the value of current assets to total assets ratio), TDR – total debt ratio (relation of liabilities and provisions for liabilities to assets – normative value should be in the range of 57–67%),
- static liquidity and solvency: CLR – current liquidity ratio (relation of current assets to short-term liabilities – normative value should be in the range of 1.2–2.0), QLR – quick liquidity ratio (relation of current assets less inventories and short-term prepayments to short-term liabilities – its value should not be lower than one), SR – solvency ratio (relation of net financial result and depreciation to liabilities and provisions for liabilities – represents the extent, to which the enterprise is able to service its debt),

- dynamic liquidity: SCER – sales cash efficiency ratio (relation of net operating cash flows to sales revenues – represents the part of the sales revenues retained in the enterprise in cash), CFCR – cash flow coverage ratio (relation of net operating cash flows to total debt – represents the enterprise ability to settle its liabilities),
- working capital management: IC – inventories cycle (relation of average inventories to cost of products sold), RC – receivables cycle (relation of average short-term receivables to sales revenues), STLC – short-term liabilities cycle (relation of average short-term liabilities to cost of materials and raw materials), NWCC – net working capital cycle (cash conversion cycle – its shortening is assessed as an increase in efficiency of net working capital management),
- profitability and productivity: oROS – operating return on sales (relation of operating result to sales revenues), oROA – operating return on assets (relation of operating result to assets), AP – assets productivity (relation of sales revenues to assets – measures the circulation speed of total assets in the enterprise: the higher is the better).

The third stage used measures of value creation and the synthetic measure of the financial situation:

- value creation: internal ROE (relation of net financial result to equity), external VAM (relation of value added as a sum of net financial result, costs of salaries, social security and other benefits, interest costs, income tax and para–taxes to sales revenues),
- synthetic measure: AD – area of a decagon stretched on sides representing the dynamics of changes in standardized value of key financial ratios. AD measure includes the ratios: GFSR, SFR – self–financing ratio (relation of equity to assets SFR = 1/TDR), RC (in times), STLC (in days), QLR, SR, oROS, oROA, AP (ratios were defined as stimulants and their values were standardized).

The study of interdependence of phenomena (time series) used the Pearson's linear correlation coefficient (r). In reference to the absolute value of the r coefficient, the following degrees of correlation strength were assumed: <0.1 almost nonexistent, 0.1–0.3 weak, 0.3–0.5 medium, 0.5–0.7 high, 0.7–0.9 very high, >0.9 almost complete. The null hypothesis stating the lack of correlation was rejected after meeting the condition p–value < α. The level of significance was assumed at α = 0,05. The correlation coefficient as a numerical value is given in results only for statistically significant coefficients. The analysis of time series also used the coefficient of variation (CV) and average percent changes $\left(APC = \left(\sqrt[n-1]{\frac{x_n}{x_1}} - 1 \right) \cdot 100\% \right)$ for observations $i = 1, ..., n$.

3. Results and discussion

3.1. Macro and meso environment

Based on 2019 in macroeconomic terms, manufacturing enterprises (combined PKD sections: B – Mining and quarrying, C – Manufacturing, D – Electricity, gas, steam and air conditioning supply, E – Water supply, sewerage, waste management and remediation activities) have got a significant share in their entire institutional sector – they dispose of resources in the form of 43.8% of employees and 48.8% of total assets, achieving results at the level of 47.0% revenues from sales and 58.1% of net financial result. Changes in the structure in 2007–2019 were not significant in terms of sales revenues and net financial result, however the share in the number of employees decreased (9.1%) while the share in total assets increased (3.0%).

Against this background the position of PKD section "Mining and quarrying" recorded successive losses in terms of the share in the number of employees, and since 2015 also in the assets of manufacturing enterprises. However, due to the diminishing share in total revenues, the share in net financial result decreased dramatically over the years 2011–2015 (Fig. 1).

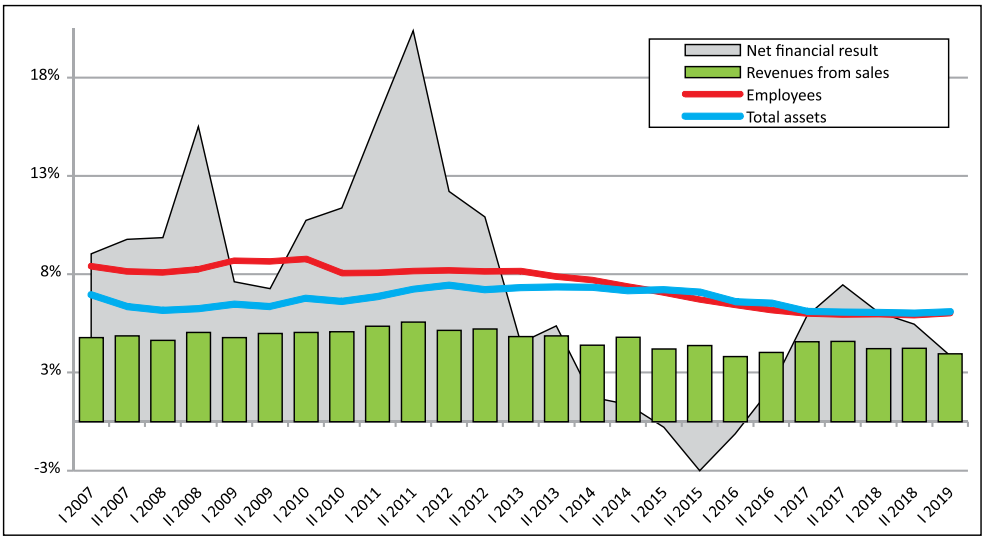

Fig. 1. Share of Mining and Quarrying (section B) enterprises in manufacturing activity in terms of the value of key categories in 2007–2019 (semi–annual data)
Source: own elaboration

Rys. 1. Udział przedsiębiorstw górniczych (sekcja B) w działalności produkcyjnej pod względem wielkości kluczowych kategorii w latach 2007–2019 (dane półroczne)

From the perspective of manufacturing activity the meso-economic environment for Mining of coal and lignite division (PKD 5) consists in the remaining 34 manufacturing divisions. In 2007–2019 there was a notable displacement of this division in terms of the share in the number of employees (decrease by 42.7%) and in total assets (decrease by 38.5%). It lost its above-average status in terms of the share in assets and approached the average level in terms of the share in the number of employees. In terms of another two features – the share in sales revenues and the share in net financial result – those share also decreased, by 27.0% and 27.4%, respectively. Both at the beginning and at the end of the analyzed period, this division had the below–average share in sales revenues, and in particular in net financial result (Fig. 2).

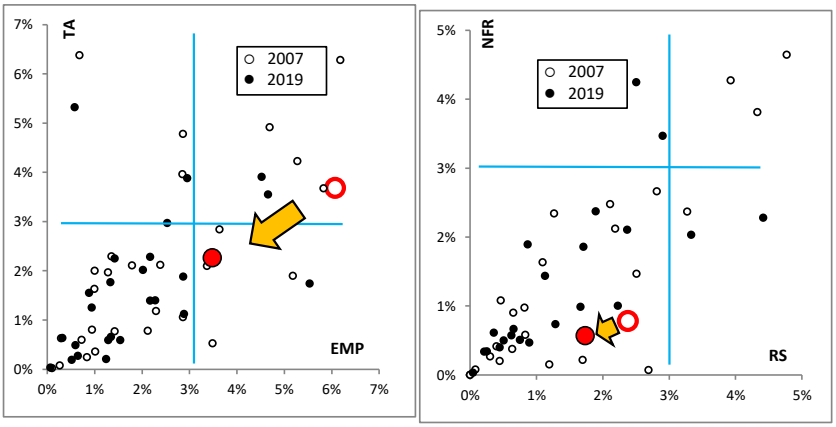

Fig. 2. Position of results of hard coal and lignite mining enterprises (PKD division 5) on the background of the remaining 34 divisions in terms of the share in the number of employees (EMP) and total assets (TA) (left panel) and in revenues from sales (RS) and net financial result (NFR) (right panel), in 2007 and 2019, respectively (semi-annual data). Notes: PKD division 5 – Mining of coal and lignite, marked with a bigger dot
Source: own elaboration

Rys. 2. Pozycja wyników przedsiębiorstw wydobywających węgiel kamienny i brunatny (dział PKD 5) na tle wyników pozostałych 34 działów pod względem udziału w liczbie pracujących (P) i majątku ogółem (M) (panel lewy) oraz przychodów ze sprzedaży (S) oraz wyniku finansowego netto (WF) (panel prawy), odpowiednio w 2007 oraz w 2019 roku (dane półroczne).
Uwagi: dział PKD 5 – Wydobywanie węgla kamiennego i brunatnego – powiększonym znacznikiem

3.2. Potential and financial results

The peak value of assets was reached by hard coal and lignite mining enterprises in 2013. In case of fixed assets it was s result of successively increasing investment expenditures up to that year. Their significant decrease (by 60%) lasting until 2017, caused the decapitalization of assets understood as the increase in the accumulated depreciation level from 55% to 62% and the decrease of their value by 18.8%. During that time the expenditures/

/depreciation ratio not only deteriorated (from the average of 1.54 for 2007–2012) but was also less than 1 (0.77 by 2017). Thus, processes of asset renewal were less intensive than their consumption (negative assessment), and the reversal of this relation occurred since the second half of 2018. The structure of expenditures was initially dominated by those aimed at the renewal of machines and equipment, while since 2011 a noticeable dominance was taken by expenditures on buildings and structures, only to be gradually lost in the last two years (Fig. 3).

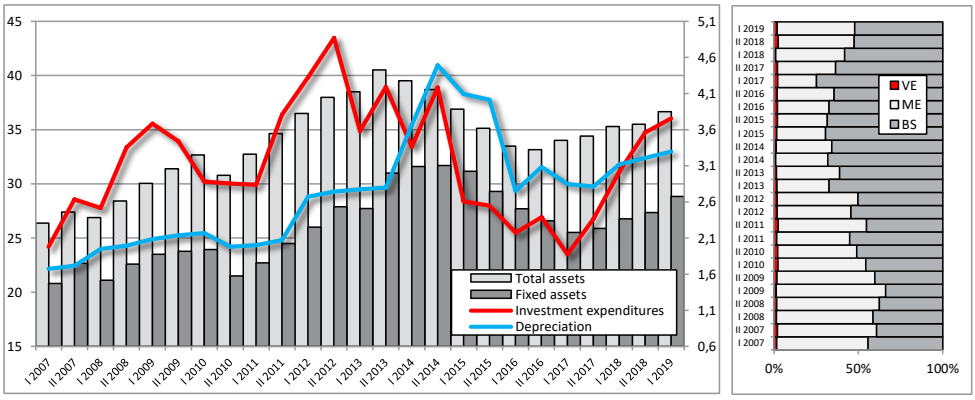

Fig. 3. Assets and investment expenditures of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data). Notes: investment expenditures – right axis (left panel). Structure of expenditures: BS – buildings and structures, ME – machines and equipment, VE – vehicles (right panel, %)
Source: own elaboration

Rys. 3. Majątek i nakłady inwestycyjne przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne, mld zł)
Uwagi: nakłady inwestycyjne – oś prawa (panel lewy). Struktura nakładów: BB – budynki i budowle, MU – maszyny i urządzenia, TR – środki transportu (panel prawy, %)

Employees still remain an important resource. Their number decreased over the entire analyzed period by 40.4%, especially notably and successively in 2013–2016 (APC = 4.6%). Changes in the number of employees as well as fluctuations in sales revenues shaped the course of the labor effectiveness curve. It was going up gradually until 2016 including visible significant periodic fluctuations (APC = 7.5%, CV = 28.0%), then after a steep increase caused by a strong growth in sales revenues (accompanied by decreasing number of employees) started to diminish. Labor productivity (related to the number of employees and labor costs) recorded a slower and more stable increase until 2016 than the effectiveness (APC = 1.5%, CV = 11.6%), and then adopted a course similar to labor effectiveness. Changes in labor effectiveness and productivity occurred against a long-term downward trend in the share of labor costs in total costs – from 42.6% to 35.4%.

Changing the dimension of the evaluation of labor effectiveness and productivity from financial to material (technical effectiveness), 2007 brought a stoppage in the long-term upward trend resulting from the multistage restructuring of hard coal mining industry being implemented since the beginning of the system transformation. The technical effectiveness deterioration lasted until 2014 (value lower by 23.4% in comparison to 2007), then it recorded a steep improvement, however further changes entered a weak downward trend. The technical effectiveness was averagely correlated with labor productivity (r = 0.47) and effectiveness (r = 0.43) (Fig. 4).

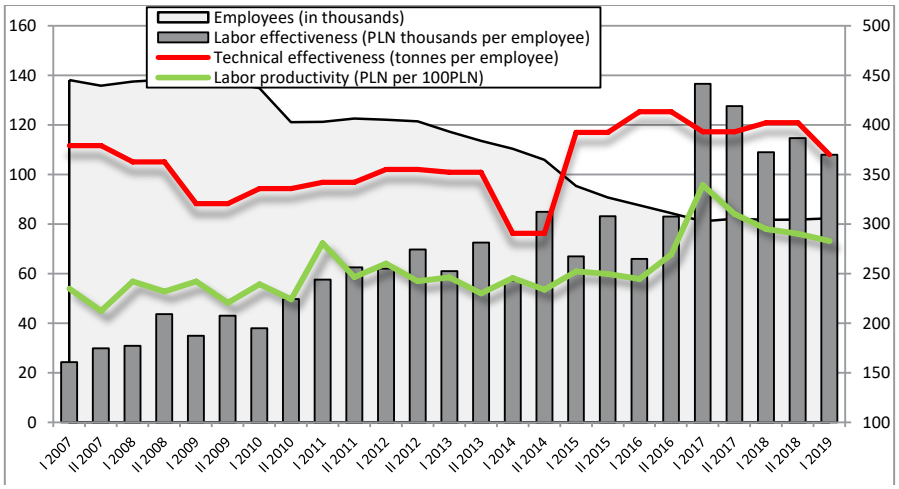

Fig. 4. Number of employees, labor productivity and effectiveness and technical effectiveness of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data)
Notes: number of employees – left axis (in thousands). Technical effectiveness per six months
Source: own elaboration

Rys. 4. Liczba pracujących, produktywność oraz wydajność pracy i techniczna przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne)
Uwagi: liczba pracujących – oś lewa (tys. os.). Wydajność techniczna w przeliczeniu na półrocza

Inventories increased in 2007–2019 by 32.3%, with relatively high volatility (CV = 37.9%). However, they were not correlated with the changes in sales revenues. The increase in receivables was slightly higher (40.9%), but accompanied by smaller fluctuations (CV = 16.8%). The correlation with sales revenues was very high (r = 0.79), also turning points and culmination levels distributed over the same periods in most cases (Fig. 5). Sources of financing were dominated by short-term liabilities (average PLN 8.0 billion), that successively increased by 2015, while nearly 1.9 times over the entire period. Their increase was stronger in periods of decreasing sales revenues (it is worth mentioning here that they were strongly correlated with costs, r = 0.67) as opposed to sales revenues, which is justified on the merits.

High levels of short-term liabilities resulted in the presence of negative net working capital in the entire period of the analysis (average level PLN –4.1 billion, minimum PLN –7.5 billion, 2.6 times increase over the analysis period), which is not typical for manufacturing enterprises. Long-term liabilities also increased and were strongly volatile (average level PLN 3.1 billion, 2.5 times increase, CV = 44.5%) (Fig. 5).

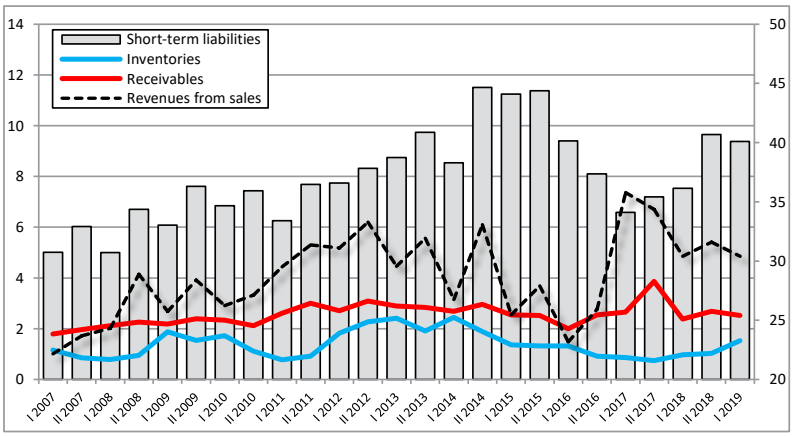

Fig. 5. Inventories, receivables and short-term liabilities of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data, in PLN billions).
Notes: sales revenues – right axis
Source: own elaboration

Rys. 5. Zapasy, należności i zobowiązania krótkoterminowe przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne, mld zł)
Uwagi: przychody ze sprzedaży – oś prawa

Sales revenues increased until 2012, but subsequent periods brought a higher rate of cost increase (negative assessment), which resulted in a periodic loss of profits (maximum PLN 3.5 billion, in 2011) generating a loss of PLN 3.0 billion in 2015. The deficit in the activity continued until 2016, turning into profits in the following periods. However, it proved temporary, as subsequent observations revealed further decreases in sales revenues and financial result. In 2007–2019, for 25 half-year periods, only 11 recorded the growth rate of sales revenues higher than the growth rate of costs (periods of financial result increase). During the most unfavorable times for mining (second half of 2013 – first half of 2016) the change rate for costs was 1.8 times higher than for sales revenues. It is worth emphasizing that this collapse related to the significant percentage of enterprises – the share of profitable enterprises decreased from 87% in 2007 to 37% in 2015 (however, the subsequent improvement in this area did not last for long).

The share of exports in sales revenues was low until 2011 (average 2.0%). In the following two years this share increased significantly (to 13.1%) and reached its maximum of

17.3% in 2018. The correlation coefficient for export revenues and total revenues was slightly higher than the average (r = 0.57), whereas there was no correlation with net financial result (Fig. 6), that indicates a strong and dominant effect of global and domestic economic conditions on the results of mining companies.

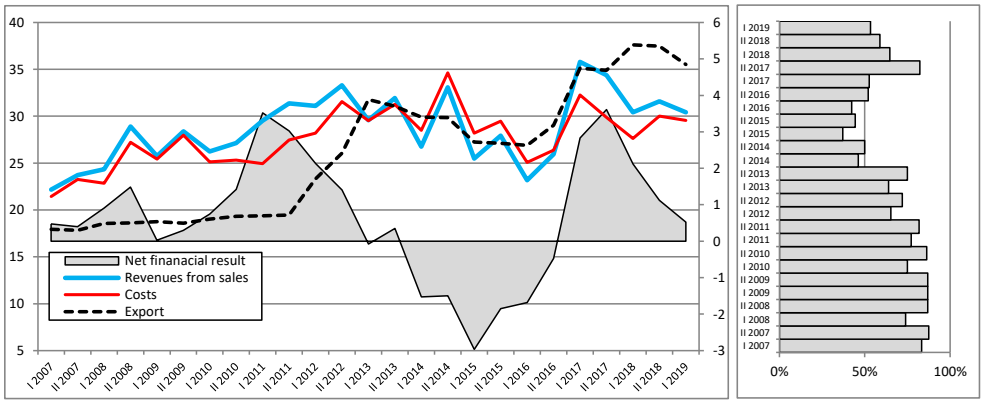

Fig. 6. Revenues from sales, costs and net financial result of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data, in PLN billions)
Notes: net financial result, export revenues – right axis (left panel).
Percentage of profitable enterprises – right panel (%).
Source: own elaboration

Rys. 6. Przychody ze sprzedaży, koszty i wynik finansowych netto przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne, mld zł)
Uwagi: wynik finansowy netto, przychody z eksportu – oś prawa (panel lewy).
Odsetek przedsiębiorstw zyskownych – panel prawy (%)

3.3. Basic economic and financial relations

The development of the curve of the general financial situation (GFSR) ratio value results in a double negative assessment, in particular after 2012. This is due, firstly, to the very low absolute value of this ratio (distance from the point defined by the "balance sheet golden rule"), and secondly, to its dramatic drop in 2011–2016. The improvement that started in 2017 was short-lived. The development of GFSR curve results from the opposite courses of its two factors – asset structure ratio (ASR) and capital structure ratio (CSR). The overlap of the highest ASR value with the lowest CSR value was characteristic for the period of economic downturn on global markets reflected in the course of GFSR (2011–2016).

Against this background, there were changes in the level of debt – short-term debt with relatively greater intensity and volatility (APC = 1.3%, CV = 15.6%) and total debt

(APC = 0.6%, CV = 9.4%). Total debt reached its peak value of 75.6% in the first half of 2016; this value significantly exceeds the normative level. In both cases, periods of debt increase and culmination points distributed over the periods of deterioration in the general financial situation ratio (GFSR) (Fig. 7).

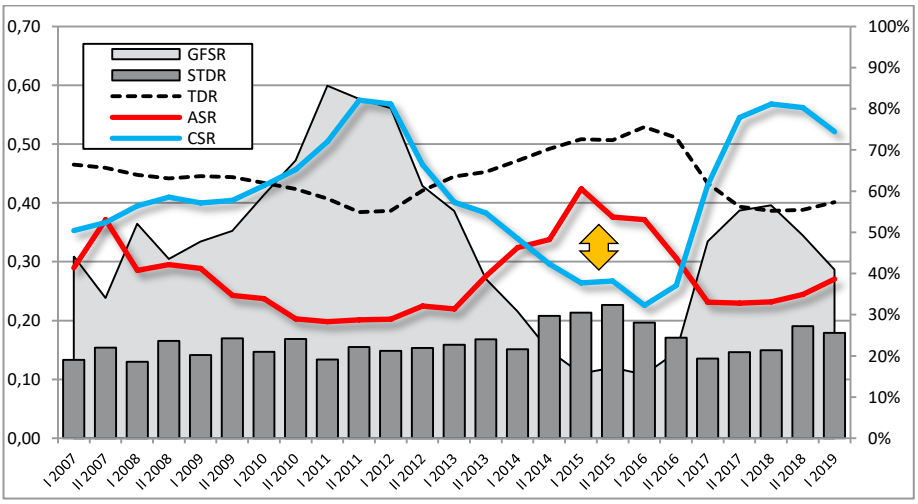

Fig. 7. General financial situation ratio (GFSR), short-term debt ratio (STDR) and total debt ratio (TDR) of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data).
Notes: GFSR – left axis (nm), ASR – asset structure, CSR – capital structure (left axis, nm)
Source: own elaboration

Rys. 7. Wskaźnik ogólnej sytuacji finansowej (WOSF) oraz wskaźniki zadłużenia krótkoterminowego (WZKR) i ogółem (WZO) przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne).
Uwagi: WOSF – oś lewa (nm). STM – struktura majątku, STK – struktura kapitału (oś lewa, nm)

The period of deterioration in general financial situation (2012–2016), outlined above, resulted in a serious decrease in liquidity and solvency (ratio values below a stable, normative level). The average level of current liquidity was only 0.9, while the minimum at the critically low level was observed in the first half of 2015. This also applies to quick liquidity (average 0.65, minimum 0.32). The value of quick liquidity ratio went in the same direction as the current liquidity (the difference between them was a result of inventories level effect, which is indicated by a very high value of the correlation coefficient r = 0.91).

In addition to the unfavorable changes in the area of liquidity, there was also a deterioration of solvency. In the critical first half of 2015, total debt was covered with the financial surplus only in 4.2% (average 16.5%). The solvency ratio was very highly correlated with the quick liquidity ratio (r = 0.84), which related to the simultaneous increase in debt and net loss occurrence. For all three ratios, the improvement after 2016 was short-lived.

The clearness of unfavorable situation in terms of static liquidity is intensified by a negative assessment of dynamic liquidity. Cash efficiency ratio stayed at a low, average level

of 11.5% (PLN 1 of sales generated PLN 0.11 of operating cash), similar to cash flow coverage ratio (operating cash was sufficient to cover 16.5% of liabilities). The directions and intensity of their changes were analogical to static liquidity ratios (Fig. 8).

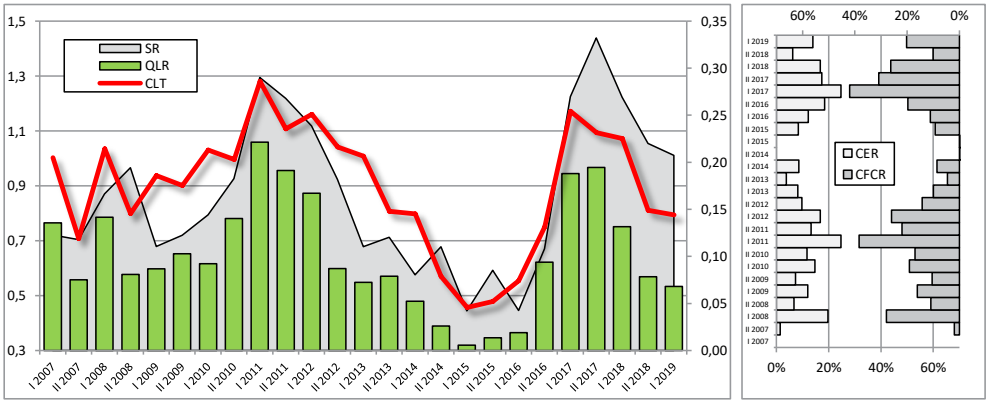

Fig. 8. Current liquidity ratio (CLR), quick liquidity ratio (QLR) and solvency ratio (SR) – left panel – cash efficiency ratio (CER) and cash flow coverage ratio (CFCR) – right panel – of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data, nm).
Notes: SR – right axis (left panel), CFCR – values in reversed order, upper axis (right panel)
Source: own elaboration

Rys. 8. Wskaźnik płynności bieżącej (WPB) i szybkiej (WPS) oraz wypłacalności (WW) – panel lewy – oraz wydajności (WGS) i wystarczalności gotówkowej (WGZ) – panel prawy – przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne, nm).
Uwagi: WW – oś prawa (panel lewy). WGZ – wartości w odwróconej kolejności, oś górna (panel prawy)

In general, the assessment of working capital management is negative, nevertheless the disturbing factors were neither the inventories cycle nor receivables cycle. The former demonstrated alternating fluctuations, not correlated with sales revenues and costs, and the improvement progressed quite systematically after 2014. Inventories were renewed every 19 days on average (CV = 35.9%). The receivables cycle (average 35 days, CV = 11.8%) was the most stable factor, being weakly correlated with sales revenues (r = 0.24).

Short-term liabilities cycle (average 109 days, maximum 170 days) had a key importance for the evaluation of working capital management efficiency – firstly, it was always disproportionately long when compared to inventories and receivables cycles. Secondly, it started growing since 2013 very quickly and uncontrollably. Thirdly, its length resulted from the inability to settle the liabilities (cf. notes on liquidity and solvency). The steep return of short-term liabilities to average values occurred in 2017, but was short-lived.

Net working capital and short-term liabilities cycles were very long (almost in full) and negatively correlated (r = –0.95). The former, as cash cycle with negative values clearly represents a highly negative assessment of managing short-term assets and sources of their financing (average – 56 days, CV = 42.2%, minimum – 110 days) (Fig. 9).

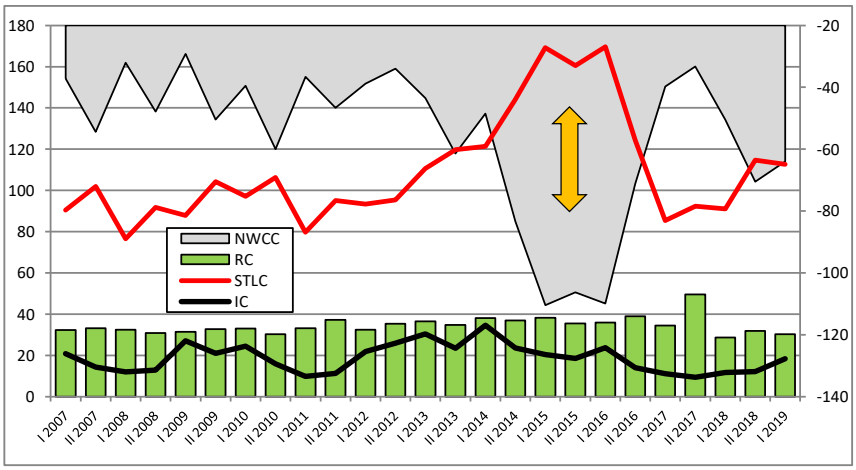

Fig. 9. Length of inventories (IC), receivables (RC), short-term liabilities (STLC) and net working capital (NWCC) cycles in hard coal and lignite mining enterprises in 2007–2019 (semi-annual data, in days).
Notes: NWCC – right axis
Source: own elaboration

Rys. 9. Długość cyklu zapasów (CZ), należności (CN), zobowiązań krótkoterminowych (CZK) oraz kapitału obrotowego netto (CKON) przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne, dni). Uwagi: CKON – oś prawa

The assessment of profitability is negative, particularly in relation to operating return on assets (average 3.8%, CV = 150.5%, minimum –6.0%), as well as to operating return on sales (average 4.2%, CV = 166.7%, minimum –9.2%). Strong fluctuations in net financial result (from the profit of PLN 3.6 billion in 2011 to the loss of PLN –3.0 billion in 2015) had a significant negative effect especially on the rate of return on sales – intensified by large, periodic drops in revenues. The first collapse occurred in 2009–2010 – in the period of overall economic slowdown. Critical problems with maintaining profitability began in 2012 and lasted until 2016, and the improvement of 2017 proved to be short-lived.

Unfavorable trends in profitability are indicated by the course of the productivity curve – the long-term downward trend visible in 2009–2016. On average, PLN 1 of assets produced PLN 0.78 of revenues, and in the worst period only PLN 0.60. Observations after 2017 are different in the sense that while maintaining relatively stable productivity, the profitability was decreased, as it happened before and started a deep crisis in the coal mining industry.

The area of profitability evaluation is one of the evident contact points with the assessment of ongoing restructuring processes (6^{th} period – after 2006). Although the apparent problems with operating return on sales and costs occurred in the period of stable growth of the entire economy (GDP growth), which would suggest a dominant role of endogenous factors, but the major effect on the results is exerted by the price of coal (exogenous factor) both on the global and domestic markets (this applies to hard coal only due to the lack of a market for lignite) and the unit cost of its mining (endogenous factor). The consequent result of these two factors is the result on sales (4^{th} degree margin or otherwise – accumulation

in the mining industry) and its rate (SPM). The accumulation from the sale of coal is a difference between the actual sales revenues and the own costs of coal sold (the incorporation of changes in inventories takes place on the cost side at the stage of transition from the sum of costs by type to the cost of coal sold) (Gawlik 2004).

This rate was almost fully and positively correlated with operating return on sales and assets (r = 0.92). In addition, the correlation of SPM with return on sales based on net financial result was at a similar level (r = 0.94). This initially allows to formulate a hypothesis that restructuring processes – especially intensive in 2015–2017 – did not affect operating return on sales. Unlike the rate of return on sales, it is influenced by the result on non-operating activities, including i.a. revenues and costs of restructuring activities. On the other hand, there was an apparent relation between the economic conditions on the coal market (reflected by price) and the rate of return on sales. However, further research is needed in this area (i.a. clarification of time series), while initially this relation can be assessed as strong and positive. In this respect, it was possible to observe an exceptional situation twice – the increase in prices was accompanied by the decrease in the rate of return on sales, including operating profitability. The first observation of this kind (second half of 2011 – second half of 2012) preceded a serious collapse resulting in heavy losses in 2014–2016, while the second started in the second half of 2017. It should also be noticed that those changes occur against the dynamic decrease in production since 2013 – of hard coal by 24.0% and of lignite by 23.4% (Fig. 10).

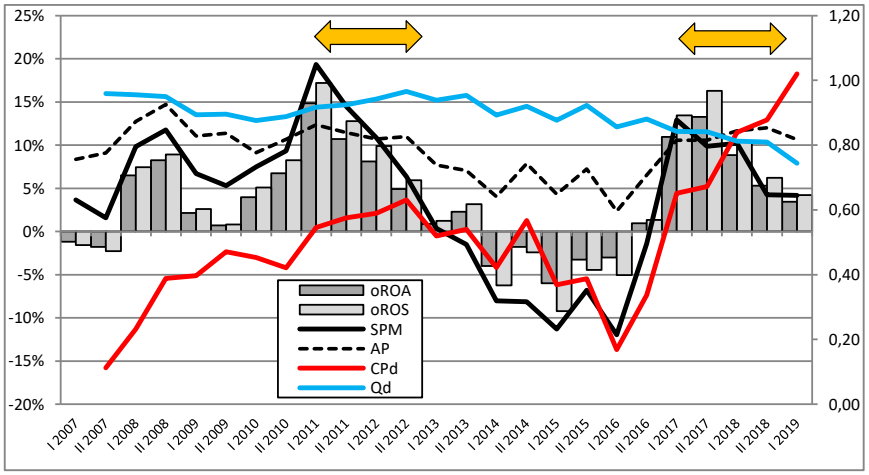

Fig. 10. Operating return on sales (oROS) and on assets (oROA), assets productivity (AP) and sales profit margin (SPM) of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data).
Notes: CPd – coal price dynamics (weighted average, constant basis), Qd – production quantity dynamics (constant basis), AP, CPd, Qd – right axis (nm)
Source: own elaboration

Rys. 10. Rentowność operacyjna sprzedaży (ROOS) i aktywów (ROOA), produktywność majątku (PM) oraz stopa wyniku na sprzedaży (SPM) przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne). Uwagi: CPd – dynamika cen węgla (średnia ważona, przy podstawie stałej); Qd – dynamika wolumenu produkcji (przy podstawie stałej); PM, CPd, Qd – oś prawa (nm)

3.4. Value creation and financial situation

In summary of the conclusions drawn so far, the attention was directed to the assessment of the degree of internal and external values creation. In case of the former, equity (EQ) was increasing until 2012, and return on equity (ROE) was taking positive values. The value transmitted to the economic system (VA) was also increasing, as well as its margin (VAM). After that year the situation changed dramatically, with the negative assessment going worse by 2015. In the following years there occurred the improvement of value (internal and external) creation, as well as the restoration of their absolute values. Unfortunately, this state cannot be considered permanent, and recent observations included another decreases in ROE and in generated value added (VA), with relatively stable ROE values.

Dynamics of changes in the synthetic measure value (ADd) proved, firstly, its very strong correlation with the measure of value added creation (VAd) (r = 0.83), which confirms the accuracy of partial conclusions on the financial situation. Secondly, it justifies the delimitation of the analysis period into sub–periods, with two culmination points (turning points) in 2011 and in 2015. The last determined point (2017) can be considered an indicator of recurring recession, especially in the situation of decreasing coal prices and observed increase in labor and external service costs. This statement, however, requires confirmation in further observations (Fig. 11).

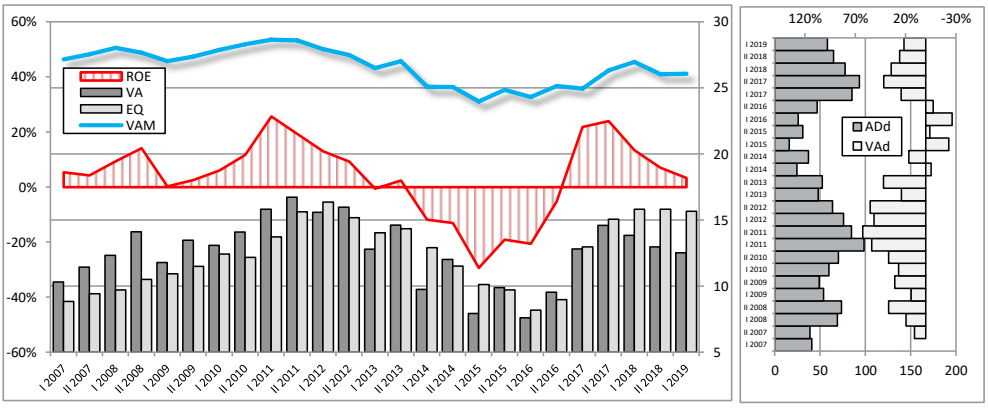

Fig. 11. Equity (EQ), return on equity (ROE) and value added (VA), value added margin (VAM) – left panel – area of decagon of ratio dynamics (ADd) and value added creation (VAd) – right panel – of hard coal and lignite mining enterprises in 2007–2019 (semi-annual data).
Notes: EQ, VA – right axis, left panel (in PLN billions), VAd – values in reversed order, upper axis, right panel (%)
Source: own elaboration

Rys. 11. Kapitał własny (EQ) i stopa jego zwrotu (ROE) oraz wartość dodana (VA) i jej stopa (VAM) – panel lewy – oraz pole powierzchni dziesięciokąta dynamik wskaźników (PDd) i kreacja wartości dodanej (VAd) – panel prawy – przedsiębiorstw wydobywających węgiel kamienny i brunatny w latach 2007–2019 (dane półroczne). Uwagi: EQ, VA – oś prawa, panel lewy (mld zł). VAd – wartości w odwróconej kolejności, oś górna, panel prawy (%)

Summary

Recognized characteristics and nature of changes in the financial condition and operation efficiency of hard coal and lignite mining enterprises in 2007–2019 lead to the following key conclusions:

- against the meso-economic environment, analyzed mining enterprises have below average share in assets, sales revenues and net financial result, and above average share in the number of employees, despite its significant reduction,
- a significant weakening of asset renewal process leading to the loss of its value and a notable decrease in the productivity of assets occurred in 2013–2017, resulting from the decrease in sales revenues (including exports) and the generation of large loss,
- that period brought about a critical decrease in liquidity and solvency, as well as in cash efficiency and coverage, while debt, both short-term and long-term increased and working capital took negative values,
- the result of unfavorable changes in 2013–2017 was a strong weakening of processes of creating internal value (leading to its losses) as well as external value – value added and its rate.

The above conclusions from the assessment of financial condition and demonstrated strong periodic fluctuations in the operation efficiency of hard coal and lignite mining enterprises can be put against the background of restructuring processes implemented in that industry, in search of causal relations that contribute to the evaluation of the effects of those activities. The vast majority of observed changes in analyzed measures in 2013–2017 was the consequence of far–reaching savings and organizational and restructuring undertakings adapting the industry to the deteriorating economic conditions in the coal markets (pressure of losing liquidity and the ability to settle liabilities). In the periods of the greatest crisis intensity – 2013–2016 – mining enterprises were selling their assets and products (often at a price lower than production costs), trying not to lose the ability to settle their liabilities, in particular towards employees and service providers. Meanwhile, the energy industry, put under constant pressure to adapt to increasing environmental requirements, was permanently forcing economically related mining enterprises to offer favorable coal prices. In course of this process, in some periods the power industry subsidized the mining industry with a temporary increase in the price of purchased fuel (coal), demanding the sale with a low margin in other period in return. In macro terms, it can be noticed that the dynamics of price and revenue growth did not sufficiently compensate the increase of business costs. The positive accumulation created (result on sales) in some periods was of marginal importance in the creation of stable basis for its permanent, positive value as well as operating and net financial result.

Processes of capital, organizational and ownership changes in the largest entities of the hard coal mining industry also progressed at that time. Polska Grupa Górnicza SA was established, that eventually incorporated mines of Katowicki Holdding Węglowy SA.

Non-production assets were also being liquidated (parts of mining facilities, and often the entire mines were contributed as assets to Spółka Restrukturyzacji Kopalń SA) and the employment was reduced. As a result of the industry capital transformation and restructuring, the financial condition of the largest mining entities – coal companies – improved in the short term. However, those were not restructuring measures anticipating the needs of the industry, but only following up.

The obtained research results allow to formulate a hypothesis, that restructuring processes – especially intensive in 2015–2017 – did not affect operating return on sales. However, there was a strong and obvious relation between changes in economic conditions on the coal market (prices) and the accumulation rate (result on sales).

It is difficult today to unambiguously refer to the future of mining industry and this paper itself did not set such objectives. In regard to the reserves of both lignite and hard coal, the industry has prospects, though burdened with many question marks (concessions and increasingly difficult geological conditions affecting costs and safety). Over the following years, coal will remain an important part of the Polish energy mix, with a downward trend. The future of steam coal use depends on political decisions, primarily on the EU decarbonization policy. The increase in the prices of CO_2 emission allowances will affect the energy sector most, causing the decrease in the share of coal fuels in energy production. Also it is difficult today to consider clean coal technologies that could replace traditional technologies of energochemical coal use. Coking coal has much better prospects, being entered into the list of 27 strategic EU natural resources by the European Commission in February 2020. The majority of this coal mining in the EU is assigned to Jastrzębska Spółka Węglowa SA, which is currently building a new coking coal mine – KWK Jastrzębie-Bzie.

Publication financed by the subsidy granted to the Cracow University of Economics.

Publication was carried out as part of the statutory activity of the Mineral Energy and Economy Research Institute of the Polish Academy of Sciences

REREERENCES

Bednarski, L. 2007. *Enterprise financial analysis* (*Analiza finansowa w przedsiębiorstwie*). Warszawa: Polskie Wydawnictwo Ekonomiczne, 216 pp. *(in Polish).*

Block, S.B. and Hirt, G.A. 1987. *Foundations of Financial Management*. Homewood: McGraw–Hill/Irwin, 768 pp.

Chomątowski, S. 1993. Development dynamics and efficiency of industrial systems (*Dynamika rozwoju a efektywność systemów przemysłowych*). *Zeszyty Naukowe Akademii Ekonomicznej w Krakowie* 115, pp. 39–42 *(in Polish)*.

Copeland et al. 2000 – Copeland, T., Koller, T. and Murrin, J. 2000. *Valuation–Measuring and Managing the Values of Companies*. New York: John Wiley Sons, 492 pp.

Cwynar, A. and Cwynar, W. 2007. EVA, economic depreciation and shareholder value creation (*EVA, amortyzacja ekonomiczna i kreacja wartości dla akcjonariuszy*). *Przegląd Organizacji* 5, p. 35 *(in Polish)*.

Dudycz, T. 2002. Financial instruments for managing company value (*Finansowe narzędzia zarządzania wartością przedsiębiorstwa*). Wrocław: Akademia Ekonomiczna we Wrocławiu, 317 pp. *(in Polish)*.

Fijorek et al. 2015 – Fijorek, K., Kaczmarek, J., Kolegowicz, K. and Krzemiński, P. 2015. Insolvency risk assessment – the ISR system concept (*Ocena zagrożenia przedsiębiorstw upadłością – koncepcja systemowa ISR*). *Przegląd Organizacji* 4, pp. 18–25 *(in Polish)*.

Gabrusewicz, W. 1999. Corporate restructuring and methods of assessing its effects (*Restrukturyzacja przedsiębiorstw i metody oceny jej efektów*). *Przegląd Organizacji* 3, p. 28 *(in Polish)*.

Gabrusewicz, W. 2014. Company financial analysis. Theory and application (*Analiza finansowa przedsiębiorstwa. Teoria i zastosowanie*). Warszawa: PWE, 376 pp. *(in Polish)*.

Gawlik, L. 2004. Costs of current coal production according to European Union regulations and internal costs of coal sold according to current mining statistics (*Koszty bieżącej produkcji węgla według rozporządzeń Unii Europejskiej a koszty własne sprzedanego węgla według dotychczasowych statystyk górnictwa*). *Polityka Energetyczna – Energy Policy Journal* 7, pp. 409–420 *(in Polish)*.

Higgins, R.C. 2009. *Analysis for Financial Management*. Homewood: McGraw–Hill/Irwin, 448 pp.

Hurry, D. 1993. Restructuring in the Global Economy: The Consequences of Strategic Linkages between Japanese and U.S. Firms. *Strategic Management Journal* 14, pp. 69–54.

Janasz, W. 2008. Capital strategies as a source of value creation and competitive advantage of an enterprise (*Strategie kapitałowe jako źródło tworzenia wartości i przewagi konkurencyjnej przedsiębiorstwa*). *Studia i Prace Wydziału Nauk Ekonomicznych i Zarządzania Uniwersytetu Szczecińskiego* 1, pp. 53–55 *(in Polish)*.

Jerzemowska, M. ed. 2018. *Enterprise economic analysis* (*Analiza ekonomiczna w przedsiębiorstwie*). Warszawa: PWE, 476 pp. *(in Polish)*.

Kaczmarek, J. 2018. The concept and Measurement of Creating Excess Value in Listed Companies. *Inzinerine Ekonomika – Engineering Economics* 29(4), pp. 376–385.

Kaczmarek, J. 2019. The Mechanisms of Creating Value vs. Financial Security of Going Concern – Sustainable Management. *Sustainability*, *Special Issue: Sustainable Value Management – New Concepts and Contemporary Trends* 11(8), pp. 1–24.

Kornai, J. 1977. *Anti–Equilibrum. Theory of economic systems (Anti–Equilibrum. Teoria systemów gospodarczych)*. Warszawa: PWN, 519 pp. *(in Polish)*.

Koźmiński, A. and Obłój, K. 1989. *Overview of the organizational balance theory (Zarys teorii równowagi organizacyjnej)*. Warszawa: PWE, 343 pp. *(in Polish)*.

Lange, O. 1965. *Reproduction and accumulation theory (Teoria reprodukcji i akumulacji)*. Warszawa: PWN, 208 pp. *(in Polish)*.

ME 2018a. *Program for hard coal mining sector in Poland (Program dla sektora górnictwa węgla kamiennego w Polsce)*. Warszawa: Ministerstwo Energii (ME) *(in Polish)*.

ME 2018b. *Program for lignite mining in Poland (Program dla sektora górnictwa węgla brunatnego w Polsce)*. Warszawa: Ministerstwo Energii (ME) *(in Polish)*.

MG 1998. *Hard coal mining restructuring in Poland in 1998–2002 (Reforma górnictwa węgla kamiennego w Polsce w latach 1998–2002)*. Warszawa: Ministerstwo Gospodarki (MG) *(in Polish)*.

MG 2000. *Correction of the government program Hard coal mining restructuring in Poland in 1998–2002 (Korekta programu rządowego Reforma górnictwa węgla kamiennego w Polsce w latach 1998–2002)*. Warszawa: Ministerstwo Gospodarki (MG) *(in Polish)*.

MG 2002a. *Program of hard coal mining restructuring in Poland in 2003–2006 using anti–crisis acts and initiating the privatization of selected mines (Program restrukturyzacji górnictwa węgla kamiennego w Polsce w latach 2003–2006 z wykorzystaniem ustaw antykryzysowych i zainicjowaniem prywatyzacji niektórych kopalń)*. Warszawa: Ministerstwo Gospodarki (MG) *(in Polish)*.

MG 2002b. *Hard coal mining restructuring in 2004–2006 and strategy for 2007–2010 (Restrukturyzacja górnictwa węgla kamiennego w latach 2004–2006 oraz strategia na lata 2007–2010)*. Warszawa: Ministerstwo Gospodarki (MG) *(in Polish)*.

MG 2006. *Strategy for hard coal mining operation in Poland in 2007–2015 (Strategia działalności górnictwa węgla kamiennego w Polsce w latach 2007–2015)*. Warszawa: Ministerstwo Gospodarki (MG) *(in Polish)*.

MGiP 2004. *Plan of access to hard coal resources in 2004–2006 and the plan of closing down mines in 2004–2007 (Plan dostępu do zasobów węgla kamiennego w latach 2004–2006 oraz plan zamknięcia kopalń w latach 2004–2007)*. Warszawa: Ministerstwo Gospodarki i Pracy *(in Polish)*.

MPiH 1991. *Program of reforms and restructuring schedules for the energy sector (Program reform i harmonogramy restrukturyzacji w sektorze energetycznym).* Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

MPiH 1992. *Proposals of restructuring programs for hard coal and lignite mining, gas and electric power, heating and liquid fuels industries (Propozycje w sprawie programów restrukturyzacji górnictwa węgla kamiennego i brunatnego gazownictwa i elektroenergetyki, ciepłownictwa i przemysłu paliw ciekłych*). Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

MPiH 1993. *Program of stopping the hard coal mining industry collapse in Poland in 1993 (Program powstrzymania upadłości górnictwa węgla kamiennego w Polsce w 1993 roku)*. Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

MPiH 1993. *Hard coal mining restructuring in Poland – Implementation of the first stage within the financial possibilities (Restrukturyzacja górnictwa węgla kamiennego w Polsce – Realizacja pierwszego etapu w ramach możliwości finansowych*). Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

MPiH 1994. *Hard coal mining industry restructuring – Program for the implementation of the second stage in 1994–1995 (Restrukturyzacja górnictwa węgla kamiennego – Program dla realizacji drugiego etapu w okresie 1994–1995)*. Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

MPiH 1996. *Hard coal mining – policy of the state and the sector for 1996–2000. Program of adjusting hard coal mining to market economy and international competitiveness condition* (*Górnictwo węgla kamiennego – polityka państwa i sektora na lata 1996–2000. Program dostosowania górnictwa węgla kamiennego do warunków gospodarki rynkowej i międzynarodowej konkurencyjności)*. Warszawa: Ministerstwo Przemysłu i Handlu (MPiH) *(in Polish)*.

Osbert-Pociecha, G. 2007. The relationship between efficiency and flexibility of the organisation *(Relacja między efektywnością a elastycznością organizacji)*. *Zeszyty Naukowe Akademii Ekonomicznej we Wrocławiu* 1183, pp. 338–340 *(in Polish)*.

Paszcza, H. 2010. Restructuring processes in the Polish hard coal mining industry in terms of the transformations and changes in the resource base (*Procesy restrukturyzacyjne w polskim górnictwie węgla kamiennego w aspekcie zrealizowanych przemian i zmiany bazy zasobowej*). *Górnictwo i Geoinżynieria* 34(3), pp. 63–82 *(in Polish).*

Pierścionek, Z. 1997. *Enterprise development strategies (Strategie rozwoju firmy)*. Warszawa: PWN, 344 pp.

Platonoff, A.L. and Sysko-Romańczuk, S. 2003. Dynamic modelling of the enterprise's functioning *(Dynamiczne modelowanie funkcjonowania przedsiębiorstwa)*. *Organizacja i Kierowanie* 2, p. 24 *(in Polish)*.

Raport 2018 – *Report 2018 – Hard coal mining in Polan (Górnictwo węgla kamiennego w Polsce)*. [Online] https://min-pan.krakow.pl [Accessed: 2020-03-02] *(in Polish)*.

Rappaport, A. 1986. *Creating Shareholder Value. The New Standard for Business Performance*. New York: The Free Press, 270 pp.

Sobczyk, E.J. 2000. Impact of changes in the economic model on the management of hard coal deposits in the Upper Silesian Coal Region *(Wpływ zmian modelu gospodarczego na gospodarkę zasobami złóż węgla kamiennego w Górnośląskim Zagłębiu Węglowym). Studia, Rozprawy, Monografie* 78, 134 pp. Kraków: MERRI PAS *(in Polish)*.

Stabryła, A. 1996. *Managing enterprise development (Zarządzanie rozwojem firmy)*. Kraków: AE, 294 pp. *(in Polish)*.

Stewart, G.B. 1994. EVA: Fact or Fantasy. *Journal of Applied Corporate Finance* 2, pp. 72–73.

Szlązak, J. 2004. *Restructuring of hard coal mining in Poland in the years 1990–2002. Analysis of the effectiveness of implemented programs (Restrukturyzacja górnictwa węgla kamiennego w Polsce w latach 1990–2002. Analiza skuteczności realizowanych programów).* Kraków: Wydawnictwo Nauka–Technika, Biblioteka Szkoły Eksploatacji Podziemnej, 215 pp. *(in Polish)*.

Waśniewski, T. and Skoczylas, W. 2004. *Theory and practice of financial analysis in an enterprise (Teoria i praktyka analizy finansowej w przedsiębiorstwie)*. Warszawa: Fundacja Rozwoju Rachunkowości w Polsce, 500 pp. *(in Polish)*.

Weston, J.F. and Copeland, T.E. 1992. *Managerial Finance*. New York: Dryden Publisher, 1182 pp.

EFFICIENCY AND FINANCIAL STANDING OF COAL MINING ENTERPRISES IN POLAND IN TERMS OF RESTRUCTURING COURSE AND EFFECTS

Keywords

financial standing, effectiveness, restructuring, coal mining and quarrying

Abstract

The subject of the research presented in this paper were financial results of mining industry enterprises (PKD 5 – Polish Classification of Activity – "Mining of coal and lignite") in 2007–2019. The research was conducted using relative and absolute financial measures, forming an extensive and coherent set of features characterizing their financial condition. The purpose was to measure and evaluate the efficiency of examined enterprises operation, considered as an attribute of development as well as factors describing and determining it. This evaluation was made against the background of ongoing restructuring processes taking into account their potential effects.

The article presents the course of the process of adapting Polish hard coal mining to market economy conditions after 1989. The process can be conventionally divided into several periods. The scope and intensity of changes in the mining industry followed the subsequent government programs for mining industry restructuring.

The lignite mining has not implemented any specific restructuring programs. The remedy processes were mainly related to organizational and ownership changes.

In relation to operation efficiency and value creation three turning points in the development path of enterprises were highlighted – 2011, 2015 and 2017, while the period of strong deterioration of results occurred in 2011–2015. It was proved that restructuring processes did not affect the operating return on sales. However, there was a strong relation between changes in economic conditions on the coal market (prices) and the accumulation rate.

EFEKTYWNOŚĆ I KONDYCJA FINANSOWA PRZEDSIĘBIORSTW WYDOBYCIA WĘGLA W POLSCE W UJĘCIU PRZEBIEGU I EFEKTÓW RESTRUKTURYZACJI

Słowa kluczowe

kondycja finansowa, efektywność, restrukturyzacja, górnictwo i wydobywanie węgla

Streszczenie

Przedmiotem badań przedstawionych w artykule były wyniki finansowe przedsiębiorstw wydobywczych (PKD 5 „Górnictwo i wydobywanie węgla kamiennego i brunatnego") za lata 2007–2019. Badania przeprowadzono z zastosowaniem względnych i bezwzględnych miar finansowych, stanowiących rozległy i spójny zbiór cech charakteryzujących ich kondycję finansową. Celem był natomiast pomiar i ocena efektywności funkcjonowania badanych przedsiębiorstw, uznawana za atrybut

rozwoju oraz czynniki ją opisujące i kształtujące. Ocena ta prowadzona była na tle przebiegających procesów restrukturyzacyjnych z uwzględnieniem ich potencjalnych efektów.

W artykule przedstawiono przebieg procesu dostosowywania polskiego górnictwa węgla kamiennego do warunków gospodarki rynkowej od 1989 roku. Wyróżniono kilka okresów restrukturyzacji, a zakres i intensywność zmian w górnictwie postępowała w ślad za kolejnymi rządowymi programami restrukturyzacji górnictwa. W przypadku górnictwa węgla brunatnego nie zostały wdrożone żadne szczególne programy restrukturyzacyjne. Procesy naprawcze dotyczyły przede wszystkim zmian organizacyjnych i własnościowych.

W zakresie efektywności działania i kreacji wartości wyróżniono punkty zwrotne ścieżki rozwoju przedsiębiorstw – lata 2011, 2015 i 2017, a okres silnego pogorszenia osiągniętych wyników wystąpił w latach 2011–2015. Wykazano, że procesy restrukturyzacyjne nie miały wpływu na rentowność operacyjną sprzedaży. Natomiast w wyraźny sposób uwidocznił się związek między zmianami koniunktury na rynku.