The Impact of Two Years of the COVID-19 Pandemic on the Functioning of a Mine Restructuring Company in Poland

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ABSTRACT

The article presents the most important changes in the strategic sector, which is hard coal mining, and shows the effects of industry transformation. The results of the research on the COVID-19 pandemic on the functioning of the mine restructuring company Spółka Restrukturyzacji Kopalń S.A. (SRK S.A.), which is the body whose main goal is the mine liquidation process, are presented. Restructuring activities have been carried out in the Polish mining industry since the end of the 20th century so as to adjust the industry to the market economy. The liquidation of the mine is the last and natural stage of mining activity. The investment process leading to the liquidation of the mine is complex and costly. The changes that are taking place in the mining environment caused by the pandemic of Covid-19 can cause both current and long-term economic effects in the operations of most economic entities. The publication analyzes the implementation of the restructuring processes in a closed mine. The analysis showed the main factors disrupting the course of a mine restructuring company (SRK S.A.), and the most important movement problems. The experience was presented and conclusions were indicated. The procedures used in the mine can also help other mining enterprises so as to cope more easily with the technical difficulties of the pandemic.

Keywords: Covid-19, liquidation of a hard coal mine, process management, restructuring of mining enterprises.

I. INTRODUCTION

The limitations that are related to the epidemic situation appeared in every sector of the economy (Ranisz et al., 2020; Riesgo Fernandez et al., 1997; Bluszcz & Kijewska, 2016a, 2016b). Not only services industry was enormously affected but also industrial companies have been affected by those restrictions. SRK S.A. a mine restructuring company is one of the few large mining enterprises on the market that announce tenders for the purchase of materials and services and fulfill their obligations on time (Belch, 2021; Nowak & Blaszke, 2020). Most of the entrepreneurs working for SRK S.A. admit that the recession is affecting on their companies, and they are having problems connected with running their business. The biggest problem in a short – term perspective is to maintain financial liquidity. For this reason, they lost the ability to hire employees temporarily or for a longer period. The long – term economic impact of the pandemic of COVID-19 will affect the activities of all entrepreneurs. It can be suspected that the longer the pandemic lasts, the more companies will have to suspend or liquidate their operations (Musial-Kidawa, 2021; Protoccolo, 2020; Puto, 2021).

Activities of SRK S.A. in the field of restructuring, revitalization and the management of the mining plants assets that are put into liquidation are financed from the budget subsidy (Ranisz et al., 2020; Riesgo Fernandez et al., 2003). Nevertheless, the market situation also affected its results (Calvimontes et al., 2020; Keselova et al., 2020; Laing 2020).

After a year of functioning in the realities of the pandemic, short and long - term effects can be noticed for the mission of SRK S.A.

II. CHARACTERISTIC OF A BRANCH

The branch of SRK S.A. with the mining area of 28.4 km² was launched at the beginning of the 20th century. The branch is located in the Silesian voivodship in the area of 3 cities and the land district. The analyzed branch is one of the largest branches of SRK S.A. The mine was a multi-level plant with a stone and coal skeleton, accessible through 5 shafts (3 mining and 2 ventilation) and a network of 90 km of excavation gates on three active levels. Exploitation was carried out on two mining horizons, 660 m and 850 m and the level of 530 m was used for ventilation. The department had a ventilation connection with a neighboring active mine. Mine pumping stations drain the natural inflow of carboniferous waters. Initially, on the premises of the main plant with an area of approximately 50 ha, there were 160 facilities (cubature facilities, steel structures, power networks and tracks). 68 objects are not planned to be liquidated (including 12 objects under the protection of the conservator).

SRK S.A. has planned to spend about 15% of expenditures on the liquidation of mining plants in 2015-2023 for the implementation of the management of its assets. The mine is being restructured in the model, leaving some of the excavations for the creation of a regional pumping station for
drainage of neighbouring mines. For this purpose, 2 shafts and about 10 km of mining excavations will be left. About 200 people are employed in the branch, including 68% underground and 32% on the surface. The liquidation of the mine is the last and natural stage of mining activity. The processes of mine liquidation are complex and costly. The mission of SRK S.A. is revitalization and restructuring of closed hard coal mines. SRK S.A. as a legal successor of previous mining exploitation, supervises and develops non – industrial property (apartments, garages, commercial premises etc.) and post – industrial property after closed mines, protects neighbouring mines by pumping water from previously closed mines and conducts liquidation and securing of excavation mines in 11 currently liquidated mining plants (Bluszcz & Smolilo, 2021; Smolilo et al., 2021b).

The activities of SRK S.A. should end before 2024. However, it should be taken into account that due to the pandemic of COVID-19, the processes of property management carried out by SRK S.A. may be extended.

An epidemic prophylaxis was introduced so as to protect the employees and the proper functioning of the branch. The scope of activities carried out, not only results from the guidelines of the Management Board of SRK S.A., but also from the decisions of the Branch Management. Only mine employees and employees of external companies providing the necessary services may enter the branch. In the workplace where it was possible, remote work or more shift work was introduced. Direct contacts between employees were limited to the telephone and e-mail contacts.

Thanks to the applied prophylaxis, only 10 cases of infections were found in the first and the second waves of the pandemic. The infections came from the family. In the third wave of the pandemic (July 2021), 12 workers were infected, three of whom most likely became infected at work. During the fourth wave of pandemic (October 2021 – February 2022), 21 of our employees were infected. Unfortunately, for two of them the disease proved fatal. So far, 94 employees of the branch have been in the quarantine.

III. METHODOLOGY

In a dynamic and competitive economic environment, the success of a mining enterprise requires modern management. The complexity of the economic situation is further complicated by the pandemic of COVID-19. The current scientific research aimed at improving the rationalization and efficiency of the revitalization and restructuring processes in mining plants is very scarce (Chmiela 2022, Smolilo & Chmiela, 2021a) despite the fact that the average cost of the mine liquidation may reach up to 70 million EUR. The available literature in terms of the mine liquidation deals only with general issues. The complexity and multidimensionality of the process management requires research in this area. The presented experiences of the branch will be the basis for improving the effectiveness and efficiency of the processes carried out in the mining company liquidating mines in the current complicated economic conditions caused by the pandemic (Laing 2020).

The aim of the research was to identify the impact of COVID-19 on the implementation of restructuring, revitalization and liquidation processes in mining plants as well as decisions related to the rationalization and effectiveness of processes in the event of an epidemic threat. The research tried to indicate areas and research problems that need to be solved (Table I and Fig. 1). In addition, the analysis of changes in the advancement of the liquidation processes and experience in their implementation in the realities of COVID-19 will make it easier to make the right decisions also in other economic entities liquidating mining plants. The research plan that was implemented was based on the Updated Branch Liquidation Program and the Annual Branch Liquidation Plans with annexes.

<p>| TABLE I. RESEARCH METHODS AND THE RESULTS OF THEIR USE IN PARTICULAR STAGES OF RESEARCH |</p>
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Fig. 1. The scheme of the research method.

In the first stage, the available literature referring to the management of processes in epidemic realities was analysed and compared with SRK S.A. experience connected with restructuring post- mining assets. The author’s considerations focused on comparing and organizing the designed data with their practical implementation. The results of the analysis made it possible to prepare the subject matter, scope of questions and a list of people intended for the direct interview used in the second stage.

In the second stage, interviews were conducted with people directly implementing the tasks and managing the liquidation processes in the branch. It allowed for the identification of areas and research problems necessary to be solved, especially for the difficulties in the implementation of the branch tasks that appeared in the event of the pandemic of COVID-19. In the basis of interviews, the most important factors disrupting the course of the processes taking place in the liquidated mines in SRK S.A. were identified and suggestions for possible changes in the procedures for the liquidation of the branch were indicated.

IV. RESULTS AND DISCUSSION

According to the rules in SRK S.A. the management of a branch assets is divided into 10 component processes (Grumela et al., 2018; Przybyla & Chmiela 2007; Turek, 2013). Fig. 2 presents the names of individual processes and the structure of expenditures on the restructuring processes of

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the branch. Besides, the scheme of their course is shown in Fig. 2. The description of the degree of implementation of individual processes is the fraction of expenditures allocated to the restructuring of a given process expressed as a percentage, while for the summary characteristics of the branch, the fraction of the total (planned) restructuring expenditures is expressed in per cent (in the period from 2017 to 2022).

**Fig. 2. Names of the processes, the schedule of their course and structure of expenditures on restructuring process carried out in the branch.**

The progress (planned and implemented) of the restructuring processes of the branch is presented in Fig. 3. The planned schedule is included in the Updated Mine Liquidation Program from 2019. Moreover, the data from 2017 to 2020 results from the periodic reports of the activity of the branch sent to the Management Board of SRK S.A. Due to too many unknowns and various possibilities of the course of the pandemic of COVID-19, plans for 2022 have not been estimated. It was initially assumed that the total investment outlays and the liquidation time would remain unchanged, but it should be assumed that due to the pandemic, it will be possible to extend the mine liquidation time with unchanged or even slightly lower total investment outlays (Turek, 2013; Turek & Jonek-Kowalska, 2013). By the end of 2019, all planned tasks were completed. Nevertheless, in 2019 a reduction in the capital intensity of liquidation activities can be observed (Fig. 3). This is due to the reduction in the costs of obtaining of service companies work and changes in the organization of work and optimization of processes in the branch. In order to reduce costs, large mining companies limit the placement of tenders for purchases or services. SRK S.A. is one of the few large enterprises for which mining-related companies can provide services. So as to obtain the order, the service providers reduce the prices, and in this way SRK S.A. may reduce the costs of its activity. In 2020, there was an additional significant reduction in the use of the budget subsidy for the implementation of the branch tasks. Not only it was due to the prophylaxis against COVID-19, but also from the deepening situation on the market of service providers for mining enterprises (Fig. 3).

**Fig. 3. An annual schedule of the restructuring of the branch (design and implementation).**

It is easy to present the impact of the pandemic of COVID-19 on the implementation of the tasks of the branch when analysing the individual component processes. The restructuring of the branch is carried out according to the model, leaving the pumping station, in this case a stationary pumping station. The designed pumping station has to protect the neighbouring mining plants as a district pumping station with an output of up to 10 m³/min. In this model of mine liquidation (Fig. 2), usually the downcast shaft, the ventilation shaft and some of the mining excavations are not liquidated (Bluszcz & Smoliło, 2021; Smoliło & Chmiela, 2021a).

It is planned to leave the downcast shaft and the ventilation 1 shaft and about 10 km of mining excavations. These facilities will be converted into a pumping station which will be later handed over to the Central Department of the Mine Dewatering Plant.

According to the adopted model of the restructuring of the branch, Process 1 (Fig. 2) may be carried out independently of Process 2 (Liquidation and securing of shafts and pits). In the event of complete liquidation of the mining plant due to the lack of the access to mining excavations, this process would have to be completed before the shaft liquidation. In the case of the branch, the shafts that are left behind will enable the liquidation of unnecessary mining excavations after the completion of Process 2 (Liquidation and securing of shafts and pits). The branch carries out the tasks of Process 1 with the amount of 1.74% of its liquidation cost (Fig. 4) (Smoliło et al., 2021a; Chmiela et al., 2022).

**Fig. 4. The progress of Process 1 (Liquidation and securing of mining excavations).**

In 2020, as a part of Process 1, 13 km of mine workings was planned through the construction of 23 insulating dams and 1 explosion-proof plug. The tasks had to be performed by own crew and would have been completed if the liquidation of the ventilation 2 shaft would not had been postponed. Due to the movement reasons, it was impossible to eliminate the mining excavations associated with the existence of this shaft. Because of that situation, it is planned to intensify Process 1 after the completion of the liquidation of the ventilation 2 shaft as part of Process 2.
According to the model with the pumping station, in the liquidated mine the liquidation of unnecessary shafts (Process 2) is usually carried out in the first years of restructuring (Fig. 2) (Smolilo et al., 2021b; Smolilo & Chniela, 2021a). Previously, one of the downcast shafts was completely liquidated and the other one, in which the closing plate was not made, was partially liquidated. In 2020, it was planned to liquidate the ventilation 2 shaft with a closing plate (Fig. 5) and to construct the missing closing plate for the previously closed downcast shaft. The closing plate had to be made after the liquidation of shaft tower (Process 4). The scope of work exceeded the capabilities of the own staff so it had to be carried out by an external company selected in the tender. The restrictions caused by the pandemic of COVID-19 and the competition between service companies led to excessive length of tendering procedures. After the tender was settled and the contractor was selected, his competitors submitted an application to the National Appeal Chamber (not due to the fault of the branch). These activities and the epidemic prophylaxis completely prevented the implementation of Process 2 in 2020. The unfinished tasks are going to be carried out in 2022. The branch allocates approximately 2.83% of its liquidation cost so as to implement the tasks of this process (Bluszcz & Smolilo, 2021).

While the liquidation of the mining plant, the tasks of Process 3 (if necessary) are carried out in the last years of the branches' existence (Fig. 2). In the branch, tasks for the last 3 years of operations were planned. Due to the fact that tasks were not carried out under other processes, all work of Process 3 was moved so as to implement in the last year of the branch existence (Fig. 6). The branch secures neighbouring mines of 4.14% of its liquidation cost. The impact of limitations of COVID-19 in this case was indirect, but nevertheless extremely significant.

The liquidation of unnecessary objects of surface mining infrastructure (Process 4) is usually carried out in the first years of the branch existence. The completion of the liquidation of surface objects gives the possibility of implementing Process 5, land reclamation (Fig. 8) (Smolilo et al., 2021b, 2021c). According to the experience of SRK S.A., Process 4 was carried out from the establishment of the branch (Fig. 7), and the intensification of activities was planned for years 2020 and 2021. This arrangement was due to the optimal sequence of demolitions ("critical sequence"). The branch allocates 8.73% of its liquidation cost to the demolition of unnecessary infrastructure. Due to the lack of specialized equipment and qualified staff, the process had to be carried out by external entities. In 2020, the demolition of buildings that were included in 27 tasks of the Process 4 was planned. There were some limitations connected with the pandemic of COVID-19 such as the limit number of people in the branch, difficulties in conducting local visits, remote work, "lockdown", etc. and what is more fierce competition from service companies, leading to excessive length of tender procedures and appeals to the National Appeal Chamber, that in practice made it impossible to carry out all planned tasks of the Process 4. The extension of the existence of facilities intended for the liquidation has its result in an increase in expenditures connected with the maintenance of these facilities in Process 6 in 2022. Having in details rules and procedures made it possible at the beginning of 2021 to break the deadlock and launch the realization of the demolition of Process 4. That was planned to be performed in 2022 in a manner that it did not interfere with the implementation of Process 5 (land reclamation).
The beginning of Process 5 (land reclamation) is possible after the completion of Process 4 (liquidation of the mine's infrastructure) and Process 6 (maintaining the facilities for liquidation in sequence ensuring safe liquidation of the mining plant) (Chmiela, 2022; Smolilo & Chmiela, 2021b). In the event of the liquidation of an unprofitable part of the mining plant located on the premises of another active mine, reclamation may be abandoned. These activities are usually carried out in the last period of the branch existence (Figure 2) and consume 0.82% of its liquidation expenditures. In the case of the branch, difficulties caused by the epidemic situation influenced only indirectly the course of Process 5. Because of the fact that Process 4 and Process 6 were not completed in 2020, reclamation works are postponed and going to be carried out in 2022 (Fig. 8). This will have its result in difficulties in the organization of work in 2022, so that work of Process 5 would start immediately after the completion of tasks of Process 4 and Process 6.

![Fig. 9. The progress of Process 6 (Maintaining the facilities for liquidation in sequence ensuring safe liquidation of the mining plant).](image)

Carrying out security works and measures to prevent hazards in connection with the liquidated mining plant (Process 7) always lasts during the branch existence (Fig. 2 and Fig. 10) (Chmiela 2022, Smolilo et al., 2021c). It is the most capital-intensive process in all branches of SRK S.A. SRK S.A. allocates approximately 35.5% of the total costs of the liquidation of mining plants, while the branch carries out the tasks of Process 7 in the amount of 42.69% of its liquidation cost. The decrease in the amount of expenditures on the implementation of tasks in this process from 2019 results from the organizational activities of the Directors of the Branches and the reduction in costs connected with obtaining services caused by the recession of the limited market of services for mining-related companies. Directly, the pandemic of COVID-19 had only a limited impact on the implementation of this process in 2020 and 2021. The majority of tasks have been carried out. The reduction in expenditures, as in 2019, is the result of the implemented organizational changes and the reduction in the costs of obtaining services partially caused by the pandemic.

![Fig.10. The progress of Process 7 (Carrying out security works and measures to prevent hazards in connection with the liquidated mining plant).](image)

Process 8 lasts throughout all life of the branch (Fig. 2). Legal regulations oblige the branch to commission the development of projects, expert opinions or analyses to external entities, usually independent experts or institutions (Chmiela et al., 2022). The cost of process implementation in the branch decreases with the passage of time and the decreasing number of maintained facilities. The branch allocates 1.43% of its liquidation cost for its implementation.
The decrease in costs incurred by the branch in this regard, that has been observed since 2019, is mainly caused by the competition on the difficult market of services for the mining industry. The right decisions of the Management Board of SRK S.A. and the Branch Management allowed for an additional reduction of costs in 2020 and 2021 of obtaining expert opinions. According to the opinions of the Directors of the Branches no influence of COVID-19 on the course of Process 8 was observed.

Process 10 (General management of the tasks performed during the mine closure) lasts for the entire period of the operations of the branch from its establishment to its liquidation (Chmiela, 2022; Chmiela et al., 2022). According to the experience of SRK S.A. it is shown that the expenditures on Process 10 is one of the three largest components of the total cost of restructuring mining plants. The branch expenditures on the implementation of Process 10 are 17.21% of the total liquidation cost. Most of the cost items incurred in Process 10 in 2020 and 2021 remained unchanged, some fell (e.g., delegation costs), while health and safety costs related to the pandemic of COVID-19 increased by approximately 12%. Thanks to the gradual reduction of employment and changes in the organization of work, a reduction in outlays has been observed since 2019, with the simultaneous full or almost full achievement of the assumed aims.

V. CONCLUSIONS

The impact of COVID-19 on the functioning of the branch was the result of the economic situation on the market of services for the mining-related enterprises rather than a result of the employees’ illness. Only in the case of the course of compensation procedures for mining damages, the delays were caused by the employees’ illness.

Epidemic prophylaxis related to the pandemic of COVID-19 applied in the branch, resulting from the guidelines of the Management Board of SRK S.A. and on the initiative of the Branch Management, allowed for proper protection of the branch employees and employees of external companies providing the necessary services. In 2020, 2021 and 2022, only 3 out of 19 cases of infection were most likely infected at the workplace and most of those infected had a mild course of the disease, but unfortunately, for two of them dies.

The pandemic of COVID-19 has affected the activities of all economic entities. The activity of SRKS.A. is financed from the budget subsidy and own revenues and therefore the impact of the crisis has not been felt yet as strong as in other enterprises. In the case of the branch, it was not possible to complete some of the tasks, the implementation of which was postponed, and the postponement of the liquidation of facilities will increase the costs of their longer maintenance in the future.

The planned liquidation of the ventilation 2 shaft and the pits that belong to it as well as the demolition of the construction facilities planned were not completed, which prevented the implementation of some of the planned tasks for 2020. There were significant delays in the implementation of some processes. At the beginning of 2021, legal actions and the correction and specification of tender procedures led to the breaking of the stagnation in the liquidation and demolition processes. Due to the unpredictability of the course of the pandemic of COVID-19 and the unclear economic situation of the branch service companies, it is not clear whether it will be possible to make up for the delays that occurred in 2020.

Correct decisions of the Management Board of SRK S.A. and the Directors of the Branches with the active and passive support of employees as well as the organizational changes in
the functioning of the branch have so far protected the plant and its employees, both epidemically and economically, from the more severe effects of the pandemic.

**CONFLICT OF INTEREST**

Authors declare that they do not have any conflict of interest.

**REFERENCES**


