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## REHABILITATION AUDIT: WHAT COAL MINES ARE TO BE INVESTED DURING THE ECONOMIC RECESSION?

**Abstract.** *Introduction.* Under pressure of restricted public investments and low level of coal mines' attractiveness, it is important to develop a strategy of defining what a coal mine is worth private investing and introducing a corporation management consistent with efficient extraction of available coal deposits. Therefore, any improvements in the decision making about investing a coal mine through rehabilitation audit are of high importance. *The purpose* is to develop approaches to rehabilitation audit acceptable for coal mining so that the later may be assessed by potential investors. *Results.* Thus, government owing coal mines may gradually improve their efficiency under pressure of restricted state budget donations only due to abandoning unprofitable sites and privatizing profitable entities. The most complicated task here is how to distinguish economically perspective and not perspective mines. More decisive approaches are needed to restructure current mining facilities. In addition, there is no benefit in the liquidation of some mines as the first step requires mines' rehabilitation and modernization with further finding the most efficient mine sites. The rehabilitation audit is usually undertaken for those companies that suffer financial losses. The main criterion for making a decision about rehabilitation or abandoning a company is its rehabilitation ability. However, available approach to rehabilitation audit does not reflect all specifics of the mining industry, which has three main pillars – nature, technology and operations. So, we offer to use the term «the level of the rehabilitation attractiveness» of a mine. It is a quantitative dimension of system efficiency. Hence, we can draw the theory of a mine that is useless to be rehabilitated if the specific margin value of its efficiency, which shows its being not perspective, is found. It is necessary to define what conditions should be met so that the extraction of anthracite, which is difficult to be reached, is efficient compared to the alternative of abandoning these deposits not extracted. Considering costs as marginal monetary value is rational since this is a business outlook of an investor willing to establish a corporation and donate a mine. However, the coal extraction has a business perspective under complicated geological conditions if total costs to extract all deposits within a mine site are lower than the highest costs among other Ukrainian mines extracting coal of the same mark. *Conclusion.* The rehabilitation audit allows assessing a mine's ability to return its debts, confirm its financial independence and consistency between available assets and business strategy. It was justified that the rehabilitation audit undertaken for mining sites implies corporate ownership of coal deposits and their extraction with lowering costs compared to the scenario if only one owner explores new mining sites with limited investment amount.

**Keywords:** coal-mining enterprise; state budget; investment attractiveness; restructuring; rehabilitation audit; cost; financial analysis.

**JEL Classification:** M11, M41, O10

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### САНАЦІЙНИЙ АУДИТ: ЯКІ ВУГІЛЬНІ ПІДПРИЄМСТВА ДОЦІЛЬНО ІНВЕСТИВАТИ ПІД ЧАС ЕКОНОМІЧНОЇ НЕСТАБІЛЬНОСТІ?

**Анотація.** У статті аналізуються особливості оцінки збиткових підприємств у процесі їх приватизації, що є особливо показовою для підприємств вугільної промисловості, успішна робота якої значною мірою залежить від залучення приватного капіталу. Досліджено проведення санаційного аудиту вугледобувного підприємства в умовах економічної нестабільності з метою аналізу, прогнозування, планування та оптимізації діагностичних параметрів, що уможливають приватизацію підприємства. Обґрунтовано сутність поняття «ступінь санаційної привабливості» шахти, що являє собою кількісну (абсолютну або відносну) характеристику того результату, який визначає ефективність підприємства як системи. Проаналізовано основні показники, які використовують при проведенні санаційного аудиту. Узагальнено особливості санаційного аудиту вугледобувного підприємства. Сформульовано пропозицію щодо економічної доцільності інвестування у відпрацювання ділянки зі складними гірничо-геологічними умовами.

**Ключові слова:** вугледобувне підприємство, державний бюджет, інвестиційна привабливість, реструктуризація, санаційний аудит, собівартість, фінансовий аналіз.

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### САНАЦИОННЫЙ АУДИТ: КАКИЕ УГОЛЬНЫЕ ПРЕДПРИЯТИЯ ЦЕЛЕСООБРАЗНО ИНВЕСТИРОВАТЬ В УСЛОВИЯХ ЭКОНОМИЧЕСКОЙ НЕСТАБИЛЬНОСТИ

**Аннотация.** Статья посвящена особенностям оценки убыточных предприятий в процессе их приватизации. Эта оценка особенно показательна для предприятий угольной промышленности, успешная работа которой в значительной степени зависит от привлечения частного капитала. Исследовано проведение санационного аудита угледобывающего предприятия в условиях экономической нестабильности с целью анализа, прогнозирования, планирования и оптимизации диагностических параметров, определяющих возможность приватизации предприятия. Обоснована сущность понятия «степень санационной привлекательности» шахты, которое представляет собой количественную (абсолютную или относительную) характеристику результата, определяющего эффективность предприятия как системы. Проанализированы основные показатели, используемые при проведении санационного аудита. Обобщены особенности санационного аудита угледобывающего предприятия. Сформулированы предложения относительно экономической целесообразности инвестирования в отработку участка со сложными горно-геологическими условиями.

**Ключевые слова:** угледобывающее предприятие, государственный бюджет, инвестиционная привлекательность, реструктуризация, санационный аудит, себестоимость, финансовый анализ.

**Introduction.** Today, mines are able to provide the expected efficiency level only if they are properly invested. The long time policy of artificially lowered prices for coal and permanent public donations caused by operational costs exceeding prices led to the lost interest in improving operations and reaching high efficiency.

Under pressure of restricted public investments and low level of coal mines' attractiveness, it is important to develop a strategy of defining what a coal mine is worth private investing and introducing a corporation management consistent with efficient extraction of available coal deposits. Therefore, any improvements in the decision making about investing a coal mine through rehabilitation audit and further rehabilitation activities are of high importance.

**Brief Literature Review.** The prominent researchers were always interested in the improved approaches of how to assess the attractiveness of mining sites. A. Amosha, M. Iliashov, V. Salli (2002) systematically analyzed a mining site, as a business with a high investment potential [1]. It was justified that, under pressure of restricted public investments and low level of coal mines' attractiveness, it was important to develop a strategy of defining what a coal mine is worth private investing and introducing a corporation management consistent with efficient extraction of available coal deposits. A great attention was paid to mines' assets and investment processes in the coal mining industry of Ukraine (G. Pivnyak, 2004) [2]. A. Vagonova (2005) considered a mine as a natural, technological and business system [2]. The first subsystem of a mine is shaped with geological conditions of the mining site, which exist from the unknown times and are unmanaged factors. The second subsystem reflects the technological advance influencing approaches to extracting deposits. The third subsystem is a result of the interaction of previous subsystems with society. The natural and technological subsystems influence a mine's efficiency directly and collaterally. In the case of a systematic approach, the indicator reflecting a mine's operations, should cover all three subsystems. Thus, it explains why employing only one subsystem to manage a mine failed. O. Galushko (2008) assessed a company integrated into the external environment of the region and country during investment and innovative activity [4].

Obviously, the coal mining industry requires foreign investments; however, negative factors of unstable policy and economy should be accounted (Negrych, 2012) [5]. As it was pointed out by Robert R. Miller and Dale R. Weigel (1972), business risks are more fearful for investors than political ones. If microeconomic risks can be predicted by investors then national and global crises will hardly be overcome during preparation, introduction and implementation phases of any investment project [6].

M. Ishchenko (2013) offered the approach to reconsideration of a mine's total debts given internal debts. It allowed improving the accuracy of financial and operations indicators to prove its business position [7].

Ukrainian government owing coal mines may gradually improve their efficiency under pressure of restricted state budget donations only due to abandoning unprofitable sites and privatizing profitable entities. The most important challenge is how to decide what mining sites are prospective and what are not. The first step towards the correct decision is the rehabilitation audit, which appeared due to distinguished external and internal audits. The evolution of the rehabilitation audit is well showed by R. Adams (1995), A. Arens and G. Lobbek (1995). They distinguish operations audit, as the internal audit for not only internal control but improvement of general productivity and efficiency in present and future. It forced operations audit to have been modernized towards rehabilitation and technological audits [8; 9].

According to the Decree of the Cabinet of Ministers of Ukraine «The order of a pre-trial rehabilitation of public companies» as of 17.03.2000 N 515 [10], data obtained due to the audit are used in making decisions about elimination and rehabilitation of mine. If production potential of the company is too low and assets are unbalanced with liabilities, the conservation and liquidation of a mine will be the best decision.

If the rehabilitation audit showed that a mine has competitive advantages, strong leadership, considerable market share, products are consistent with the country's development priorities and financial sources are available, the decision about financial rehabilitation of the mine can be made. However, current rehabilitation audit does not meet specifics of coal mining industry, which covers three subsystems of nature, technology and economy. Thus, this issue is required to be researched.

**Purpose.** The research is aimed at analyzing current approaches to the rehabilitation audit and developing improvements needed for the coal mining industry to provide growing investment attractiveness of coal mines.

**Results.** One of the most topical issues for a coal mine is making managerial decisions that will provide the investment amount needed for its growth. The most important indicator for assessing a mine's growth is its investment attractiveness. This indicator should be taken into account as financial resources are always restricted. The problem is in the trade-off between invested resources and gained benefits. More decisive steps are needed to modernize assets across the mining industry. The first step is their rehabilitation with technological modernization. It will allow separating the most attractive mines with high expected profit. The second step is to eliminate mines with low expected profit. There are many mines in Ukraine, which might be profitable in case of effective management. The strong financial position of a mine is an important reason for its stable activity. It is based on the stable payment capacity, high balance liquidity, financial independence and other business indicators.

The rehabilitation audit is the separate activity of many auditors. It is specific in its approaches, objects and purposes. One of the characteristics of the rehabilitation audit is its applicability to the companies under financial pressure. The aim of the rehabilitation audit is to assess rehabilitation capacity of the company through operations and finance analysis compliant with the audit policy. Herewith, a company's rehabilitation capacity is the main criterion for making a decision about its elimination or rehabilitation. The final purpose of the financial rehabilitation of the company is its profitable running over a long period. Therefore, the rehabilitation capacity of the company is referred to its ability to run efficiently.

Firstly, we should analyze operations and finance of a company by employing operations indicators and asset ratios. A balance sheet serves for finding a mine's asset value and its liabilities. The rehabilitation audit operates two important indicators among others. They are the absolute liquidity as of starting and finishing points of the analyzed period and the level of payability.

According to the accounting data as of the last date of the report, the rehabilitation audit implies finding receivables and payables with the fixed date of their appearance. In addition, fines and penalties recognized by the debtor or arbitrate trial are included into operations results until they are received. Exactly, they are contained in the reports of receiver and debtor in the receivables and payables respectively [10].

When analyzing labor, workforce turnover, especially among engineers and average wage are taken, as well as lost working hours and hidden unemployment. An important element of the analysis is the assessment of units of unfinished building operations so that one can decide whether they are worth selling to cover current debts. However, the rehabilitation audit does not take into account all specifics of the mining sites, which are three-dimensional systems with natural, technological and economic elements [3]. Basic requirement in privatization of mines is profitable extraction of coal. Assume that a mine is independent legal entity with large deposits of valuable anthracite coal sold without enrichment. The condition for the mine's development, in this case, is having a break-even position at least.

Most anthracite coal mines located in the Donbas region have been operating for a long time, and considerable part of their deposits has been extracted. However, due to some reasons, certain areas remain unexplored. Consequently, the task is to find specific indicators that allow extracting deposits of anthracite coal laid in the areas with hard geological conditions

be more beneficial than abandoning these deposits. The core aspect here is the criterion of deposits extraction or their conservation.

Therefore, we introduce the notion of the level of rehabilitation attractiveness of a mine. This quantitative indicator helps to introduce the term of the mine being attractive for rehabilitation in case of defining the margin after which the mine is prospective for investors. Obviously, mine with small deposits is not worth investing even its other indicators are perfect.

Therefore, the analysis of a mine's structure opens the following approach. Each subsystem of a mine is decided to be reflected in two main quantitative indicators (Table). It is rational to select the indicator of total costs as the marginal value since this is a major indicator for investors when taking decisions about corporate financing a mine. However, this approach may also be not efficient since a mine may have too high total costs across the sector while certain area for future corporate extraction may be highly profitable. Then, the corporate extraction may be considered inefficient while, in fact, it will be very profitable across the region and industry [11].

Table: Features of a mine which determine its prospect	
Subsystem	Features
Nature	1. Layers capacity 2. Index of a mine's status influenced by nature
Technology	1. Technology reliability 2. Weighted length of excavations
Operations	1. Costs per 1 ton of coal 2. Annual coal production

Source: Grouped by the author

The above said implies the following statement to be made. Mining operations within the area with hard geological conditions are worth starting if total costs of coal production are lower than maximum total costs met across mines producing the same coal. The equation for the statement is following:

$$C_{i\ gha} \leq \max\{C_j\}, \tag{1}$$

where  $C_{i\ gha}$  – total costs of coal production within geologically hard areas;  $\max\{C_j\}$  – maximum total costs met across mines producing the same coal.

The general task can be outlined as finding conditions that meet economic efficiency in producing anthracite coal within the areas with hard geological status in case of alternative decision to abandon mine. The core aspect here is the criterion of deposits extraction or their conservation.

We offer to assess economic efficiency of mining operations within areas of hard geology according to the term of returned investments to these operations. The term is expected to shorten due to lowering total costs:

$$T = \frac{K}{C_0 - C_1} \leq T_0, \tag{2}$$

where  $T_0$  – desired term of investment return;  $K$  – additional investments to mining operations within geologically hard areas;  $C_0, C_1$  – respectively costs of coal production before and after its extraction within geologically hard areas.

Lowering costs of anthracite coal production is possible due to lowering total costs per product unit caused by the economy of scale effect:

$$\Delta C = C_0 - C_1 = C_0 - \frac{R_0 + \Delta R_0}{D_0 + \Delta D_0} \tag{3}$$

$$\Delta R_0 = \sum_{i=1}^n R_{\Delta i},$$

where  $R_0$  – costs of coal production across a mine before mining operations within geologically hard areas;  $D_0$  – coal production before mining operations within geologically hard areas;  $\Delta R_0, \Delta D_0$  – cost increase and production growth due to mining operations within geologically hard areas;  $n$  – processes that suffer cost increase due to mining operations within geologically hard areas.

The equation (3) shows that geologically hard areas are not worth being operated if it causes growing costs across a mine except rare and deficit types of coal that are worth donations.

**Conclusion.** By making a conclusion, we should declare that changes in the ownership of mines cannot be a primary purpose. It is necessary to strive for their financial rehabilitation and technological modernization. The current stage of economic development is to be accompanied with the perfect knowledge of the core essence of the rehabilitation audit. Unfortunately, there are too few experts in the field of rehabilitation since each company requires to be individually assessed.

The rehabilitation audit to a mining company allows assessing its readiness to pay all bills and be financially independent. It was justified that the rehabilitation audit implies corporatization for joint extracting coal deposits if costs reduction is observed under restricted investments.

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