

Article

Analysis of the Main Coal Mining Restructuring Policy Objectives in the Light of Polish Mining Companies' Ability to Change

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Received: 17 May 2020; Accepted: 24 June 2020; Published: 25 June 2020



Abstract: This article presents the results from research performed on the implementation of restructuring policies of Polish mining enterprises. The study sought to verify whether the changes planned in Poland since the 1990s have been successfully introduced. The main objective of the restructuring of the Polish mining industry was to transform it into a profitable, cost-effective sector, which would be able to survive in a competitive market. The study also allowed the determination of a ratio giving a clear and synthetic outcome—called the indicator of the ability to change (WZZ). This indicator included criteria for assessing the efficiency of a company during the process of change, the fundamental errors committed during the change process, and the reasons for a low level of ability to change. The WZZ indicator achieved only an average level of 30%. The main errors committed during the change process are the mining enterprises' lack of experience in change management and a lack of executive conviction about the need not only for proper management of the process of change, but also for change in general. The problem is also a lack of adequate knowledge, competence in the field of change management, and communication with employees. Low level of ability to change is caused by the inflexible organizational structure, the organizational culture, a lack of motivation, and the limited flexibility of the human factor.

Keywords: Polish restructuring policy implementation; change management; a company's ability to change; efficiency of institutions in a period of change

1. Introduction

Recent years have proved to be very challenging for mining companies around the world. The decline in demand for energy resources is mainly related to the decrease in demand from the Chinese market. Such circumstances have been triggered by the slowdown of the Chinese economy. The shale gas revolution in the USA has also had an impact on the decline in prices of energy raw materials. This situation has led to an unprecedented situation in which the largest mining groups around the world (e.g., Peabody Energy Corporation, New World Resources) have come under threat. Record low prices for raw materials coupled with high production costs, falling demand, huge surpluses, and falling prices have resulted in dwindling profits and a sharp erosion of mining companies' revenues. These problems are being faced in China, the United States, Australia, and Poland. In addition, the situation in Poland is being complicated by the constant attempts to restructure the hard coal mining sector. Unfortunately, those efforts being made to improve the condition of Polish coal companies have not been effective for decades, as evidenced in this publication.

The transformation of hard coal mining in Poland began in 1989 and continues to this day. The purpose of the system change was to adapt the mining industry to the market economy and market needs. Several restructuring periods can be distinguished, the first in 1989–1992, the second 1993–1995, the third covering 1996–1997, the fourth 1998–2002, the fifth 2003–2006, the sixth 2007–2015, and the last one from 2016 to the present day. The organizational structure of the mines underwent changes and coal companies' associating mines were created. In the initial period, there were 70 mines, which became independent. This did not bring the desired results, as it caused a competitive struggle between the mines; thus, they were incorporated into six coal companies. In the following years, the number of companies was reduced. Until 2016, only the 4 largest coal companies existed, of which 2 were finally merged to form the Polish Mining Group (8 mines). The others are Jastrzębska Spółka Węglowa (4 mines), Tauron Wydobycie (3 mines), as well as the KWK Silesia and Bogdanka, Węglokoks, Siltech, and ZG Eko-Plus mines. Coal companies mostly belong to the State Treasury. Even if the State Treasury is not the largest shareholder directly, the owners are state-owned companies. It is a strategic sector; therefore, in each instance, the restructuring process has been financed from the state budget. Financing will last at least until 2023. The basic goals of all restructuring programs developed over the years have been to transform the mining industry into a profitable, efficient, and economically effective industry. Partial goals have also been set. Their task has been to enable achievement of the main goal: To increase in labor productivity by limiting employment, reducing production capacity, and optimizing production costs. As the authors showed in earlier publications [1], these goals could not be achieved; mining was profitable only during coal boom periods.

Despite limiting employment, productivity did not increase, and the production process has been characterized by a decreasing economy of scale because, despite the efforts of many scientists, managers, and the commitment of serious financial resources, the goals have not been achieved. The authors decided to look for the reasons for almost thirty years of failures in a place where they had not been sought so far. It was assumed that the created programs were often a response to political demand, and the plans did not correspond to market realities. Therefore, it is necessary to indicate errors in the process of planning and managing change in mining enterprises, which have always been overlooked and unnoticed by the rulers.

The long-term problems of mining in Poland and the degree to which the problem has become entrenched in the sector provide an excellent example for analysis. This facilitates the identification of both the main obstacles to companies adapting to the changing environment, and the causes of delays between the occurrence of changes in the business environment and companies' reactions to them [2–5]. Energy security in Poland depends on the coal mining industry. Whether the industry manages to survive will have a huge impact on the form of Polish energy policy in the future. However, Poland does not at the moment have another primary domestic energy carrier that could replace hard coal. To meet the demand for electricity without coal, Poland can only obtain primary energy carriers through imports. This, however, leads to energy dependence on not always politically stable regions around the world [6]. Such a situation (regarding energy security) is also prevalent in other European Union (EU) countries.

The main objective of the restructuring of the Polish mining industry was to transform it into a profitable, cost-effective sector, which would be able to survive in a competitive market. The goal was to be achieved through the introduction of appropriate changes. These were mainly changes of technological, organizational, and structural nature, affecting human resources. Change management is a crucial and integral part of the changes because it is designed to allow people to accept these changes (the transition from the current state to the state scheduled after the change) using an appropriate set of actions and techniques [7,8]. In the case of the coal industry, sensitivity to change and flexibility are classified at the lowest level in relation to other sectors and industries. This is a result of the specificity of the applied extraction technologies and techniques (technological flexibility)—the average lifetime of the mining level spatial structure is 25 years. The next reasons are the limited flexibility of the human

factor (in terms of employment) and the limited ability to adapt the organizational structure to the turbulent environment (organizational flexibility) [9].

The impact of coal-based energy also means that not only Poland but also other European Union (EU) countries are trying to eliminate coal and lignite from the energy mix. Coal combustion generates not only greenhouse gas emissions but also a waste, the management of which causes many problems [10]. However, due to the fact that Polish energy security is based almost 90% on coal, it is very important for mining companies to be able to adapt to the falling demand for this fuel. They guarantee the security of the country, and their survival in a changing market is crucial. Therefore, the restructuring of Polish mining should be carried out using available methods of enterprise management in a turbulent environment. This applies both to ensuring an adequate level of labor and capital, and also seeking technologies that will be able to eliminate the negative impact of coal combustion on the environment (CCT).

Due to the above claims and the need to adapt the mining companies to the changing market, it will be necessary to implement wide-ranging changes in the near future. Planning, design, and efficient implementation will be indispensable. In order to facilitate this procedure, this paper contains key aspects of the changes, together with tips on the tasks to be implemented in order to introduce these changes in an efficient manner, as well as examples of the problems that enterprises may encounter.

The hard coal mining restructuring programs in Poland are not being properly implemented. To be able to create and implement a correct restructuring policy, it is necessary to know the main causes of existing failures. During the implementation of the restructuring changes, ongoing monitoring of the results of the measures undertaken will be necessary. Appropriate assessment techniques and methodologies are essential. Assessment will enable the necessary adjustments to the process of change to be made on a regular basis. This makes it possible to significantly shorten the introduction period and reduce the decrease in the performance of both the company and the workforce.

The assessment of the ability of mining enterprises in Poland to change presented in the article is necessary in order to discover errors made during many years of unsuccessful attempts to restructure them. Restructuring activities were mainly based on the experience of decision-makers. The human factor having a huge impact on the success of the entire enterprise has been ignored so far. However, the proposed measure makes it possible to clearly, unambiguously, and quantitatively determine the level of ability to change. It allows the detection of errors made so far, and this in turn is extremely important, because it will affect the survival of Polish mining companies on the market, which guarantees the security and energy independence of the country. It is assumed that most of the undertaken changes generally fail. This is a statement that often removes responsibility for the failure of the change process from decision-makers. There must be no division between employees and managers. Organization development in the future should unite all employees in pursuit of success. That is why it is so important to show those areas where there are dysfunctions in the process of change management. This will allow for their removal, and help achieve designated goals [11].

To summarize the presented information, it should be stated the need to introduce a modern method of measuring the level of a company's ability to change.

In this paper, we present research aimed at developing an indicator of the ability to change (WZZ) of mining enterprises in Poland. The proposed indicator can also be used in other industries (after the necessary adaptation). The problem of the need to manage changes in Polish enterprises is often ignored. The attention of managers is mainly focused on the technical aspects of changes, while the most important factor is employees. Therefore, it was necessary to indicate a method for quantifying the level of enterprise preparation for change on a 0–100% scale. The presented method makes it possible to determine those aspects of the change process that need to be improved, and those that do not need additional attention. The ideal result would be to obtain a value of 100% for the WZZ indicator. This is the pattern to be sought, but it is most often idealized and unreachable. The indicator can also be considered dynamically. It will allow the progress of implementing changes

in the enterprise, as well as the quality of the change management process, to be checked. The analysis also made it possible to discover errors that are made during the restructuring process in Polish mining.

Changes Already Implemented in Mining Companies

Mining companies have failed to respond in advance to emerging macro-environment changes. Therefore, these changes have been forced and reactive. First, companies had to reduce their production costs and improve labor productivity.

These objectives were to be implemented mainly by the reduction of employment levels (labor costs account for about 50% of the total cost of production), by the transfer of certain tasks to specialized external entities (outsourcing), by the limitation of production capacity in order to adjust to the falling demand for coal, and by the improvement of labor productivity and the adjustment of coal production level to correspond to the demand for this energy carrier.

Reforms of the mining industry have been introduced since the beginning of the 1990s by successive governments, and the inconsistency of their implementation has created an environment in which the Polish hard coal mining sector finds itself in the end-phase of its life cycle.

The changes have been primarily related to production volumes and the cost of hard coal production. According to our earlier research findings, these objectives have been achieved only partially.

The actual results of the undertaken activities are as follows:

- The reduction of employment without any limitation of production costs. Over the last ten years the cost of wages has increased by 80%;
- The exclusion from mines of those tasks that do not contribute directly to the creation of added value, e.g., through outsourcing. However, this does not always lead to cost reductions. Before using this solution, companies should simulate costs;
- A 50% decrease in labor productivity in the last decade [1].

The chance for efficient implementation of changes increases with the understanding of the changes' essence and the nature of the organizational movement. This is also influenced by the increase in knowledge and precision of the generation of new change management tools. In the era of globalization, due to the rapid pace of technological development, and changes in social and demographic trends, the new model of the organization's functioning must take into account innovation, adaptability, flexibility, quality, and speed of action. In light of the above, the traditional organizational structure, based on a hierarchical top-down approach to management, is no longer applicable. These changes have radically modified the role of manager, who should not focus as before only on the technical and operational dimensions of management. The change leader should combine operational know-how with interpersonal skills. This ensures employees' involvement by showing them a vision of change. This treatment implies the creative and entrepreneurial behavior of employees. However, for the manager to be able to take effective actions, it is necessary to recognize the weaknesses of the changes process in the mining enterprises.

Because the research conducted in Poland does not usually focus on the effectiveness of applied change management methods (if any are used at all), the authors decided to find the reasons for the failure of restructuring coal mining in Poland in this field.

2. Experiment Outline

Analysis of the quality of the change process and the way it is perceived by employees allows for the detection of irregularities in the process of change management and provides a chance for the rapid correction of errors. Past research has characterized the basic problems and mistakes made while making changes [12–19]. These errors include the incompatibility of changes with the chosen targets, chaos in the change process, as well as the lack of understanding by the company of its strategic objectives, a lack of necessary knowledge about business management, problems with the flow of

information, and information often coming from informal channels. In addition, managers do not focus on combating resistance to change, which can be balanced or eliminated only by identifying as many benefits as possible. There are also no companies specializing in the field of management of the process of change.

As for employees, there has been a lack (or only minor) of their participation in the design process for changes. They have not noticed the presence of a change leader; they have not received information about the process of change across the enterprise. Causes of changes, their progress, and any benefits of changes have been transferred to them only after the implementation of changes. There has also been a lack of sufficient interest from top management. However, the knowledge acquired in the process of change has been perceived as unnecessary and has not been reused.

This represents a threat to appropriate company management and resource allocation [20,21].

However, to be able to monitor the quality of this process it is necessary to set a ratio giving a clear, synthetic outcome. The ratio allows for a comparison of the ability of different mining companies to change. This would be possible not only between individual mines and coal companies but also over time. Companies are operating in a turbulent environment in which the only constant is change. Hard coal mining is struggling with seasonal supply and demand for coal. The desire to survive and grow in a stormy market is forcing companies to adapt to changing conditions.

This is an extremely complex challenge, which may, however, stimulate a creative approach to solving strategic problems [22]. The ability to change is a source of flexibility in a company. If an enterprise is characterized by an inadequate level of ability to change, then the change will not take place, it will be improperly designed and adversely altered during the process of its introduction, and therefore, will not give the expected results; the implementation of the change will occur over an excessively long period of time, the maximum acceptable level of organizational efficiency decline will be exceeded, and the change will involve a much higher cost than anticipated.

There are many methods to assess a company's ability to change [23–27]. The method presented in the article has been adapted to change readiness in the case of the Polish market, and in particular the specifics of hard coal mining. This specificity consists mainly of not paying attention to the importance of management methods and the impact of their proper selection on the overall condition of the company. This particularly applies to heuristic methods and qualitative assessments. Therefore, the authors wanted to propose a quantitative measure that would clearly communicate in which areas the company functions properly, and which factors taken into account in the assessment should be particularly considered. The proposed quality of the change process map gives such an opportunity. It is also very important that experts determine the importance of factors (weight) which affect the final result of the measure. In this way, experts are able additionally to influence the final assessment. An insignificant factor that even receives a high assessment of the ability to change will not have a significant impact on the final value of the measure. The WZZ indicator additionally constitutes one synthetic percentage measure indicating the total ability to change for the entire enterprise. This allows the recipient of the analysis to be confronted with a clear message, which has a positive effect on the level of the organization's motivation to change.

The study was conducted in accordance with the Delphi method guidelines. Its application is very useful when conducting research in conditions of high uncertainty, during the study of unknown problems, which constitute new research fields for which there are no empirical studies to determine certain trends. This method made it possible to obtain the opinions of independent specialists anonymously. It also avoided imposing dominant opinions on the rest of the group and eliminated any unwillingness to express honest views. The problem was defined by the study organizer. A trial study was conducted that made it possible to formulate the survey in its final form. Questions were identified and eliminated whose scope overlapped. Experts were also asked to indicate any additional issues that should be included in the survey. This procedure helped to speed up the test. The form was provided to the experts and their responses were subjected to an opinion compatibility test (coefficient of variation). In the event that compliance was unsatisfactory, an additional test round should be

carried out. Five experts were eliminated due to their extreme answers. Their responses were treated as outliers. To identify such observations, a box plot can be used.

Experts were also asked to answer additional questions, which made it possible to specify the problem in more detail and find a way to solve it. After receiving the survey results, first of all, the statistical analysis of the obtained answers on the basis of additional questions was carried out. It served the initial recognition of the situation in coal companies. The results of a similar analysis can be found in an earlier publication of the authors [28]. In the next step, the data were analyzed using the formulas presented in the article:

- The authors calculated w_i —the importance of i -th parameter;
- In the next step w_{iw} —the relative weight of the i -th parameter;
- c_i —the satisfaction rating of the i -th parameter;
- On the basis of the relative weight of the i -th parameter and the satisfaction rating of the i -th parameter, the value of WZZ was calculated.

Subsequently, a map of the change process quality was developed based on the calculated values.

3. Results and Discussion

In order to determine the level of mining companies' ability to change, we used an indicator of the ability to change (WZZ) [29,30]. Information obtained using the WZZ indicator was divided into two groups. The first determined the degree of fulfillment of employees' expectations (in relation to the process of change). Based on the second group, we could discover what employees sought and which of the investigated aspects were the most important or irrelevant to them. A ratio was determined using the following formulas [31–33]:

$$WZZ = \sum_{i=1}^N w_{iw} \times c_i \quad (1)$$

$$w_{iw} = \frac{w_i}{\sum_{i=1}^N w_i} \quad (2)$$

$$w_i = \frac{\sum_k w_k \times n_{wk}}{\sum_k n_{wk}} \quad (3)$$

$$c_i = \frac{\sum_k c_k \times n_{ck}}{\sum_k n_{ck}} \quad (4)$$

WZZ—an indicator of employee satisfaction with the changes, and employee opinion on the company's ability to make changes;

i —the parameter included in the questionnaire;

k —the number of points on the scale used in the questionnaire;

w_{iw} —the relative weight of the i -th parameter;

w_i —the importance of the i -th parameter;

c_i —the satisfaction rating of the i -th parameter;

n —the number of tested aspects;

w_k, c_k the value of the assigned weight and assessment;

n_{wk}, n_{ck} the frequency of each assessment.

This study allowed for the recognition of the expectations of employees regarding the process of change, the quality of this process within their organization, their expectations in relation to the management, the causes of their resistance to change, and the possibility to reduce or eliminate this resistance. This will help improve the quality of changes within the company.

The determination of the WZZ indicator proceeded in the five phases. The first one was the identification of factors exhibiting the greatest impact on the quality of the change process (these factors were identified based on the literature survey [34–40]). The second one was the determination of a group of experts who were asked to express their opinion (the study involved 98 experts, with relevant competencies and work experience). The third was the creation of a questionnaire and the conduct of the study. The fourth was the determination of the WZZ factor and maps of the process of change quality. The last one was the analysis and interpretation of the results.

The expert group was selected to include employees of the coal company, as well as scientists who were specialists in the field of mining enterprise management. The authors conducted research as part of an agreement with the largest Polish coal company. Information needed to conduct the changeability study was not collected by the company, so it was obtained as part of an anonymous survey. So that the experts could respond according to their beliefs, the survey took place outside their workplace. In order to properly select the group of experts, objective selection criteria were used, such as seniority, and practical or theoretical knowledge of the subject under study. The group of respondents included employees from various management levels. The division into management levels from which the respondents came from was not distinguished to maintain the full anonymity of the answers. Only one respondent came from the highest management level, but at the same time, he belonged to the group of scientists who took part in the study. Middle and lower-level employees were treated as employees in general because any changes occurring in the coal industry are top-down changes imposed on employees. Therefore, regardless of the management level, employees are subject to the introduction of imposed changes that are not initiated by them. The study was adapted to the coal company for which it was conducted. It was one company associated with most of the hard coal mines in Poland. A benchmark is not available in our country because similar studies have not been conducted or their results have not been published.

Respondents were asked to determine the ability of their organization to make changes on a scale of 0–10; where 0—total lack of capacity, and 10—excellent ability. They determined the validity of each of the criteria on a scale of 0–10: 0—criterion irrelevant, 10—the most important criterion. The study was divided into two stages. First, respondents were asked about the ability of their organization to change from the perspective of managing the change process. In the second part, questions concerned the ability of their company to change during the implementation of tasks such as production management, costs, and human resources.

Stage 1

The factors determined during the study of the literature were:

- The effectiveness of change implementation (c1);
- Accuracy in terms of defining the costs associated with making changes (c2);
- The ability to solve problems caused by resistance from workers (c3);
- The ability to determine the moment at which a change should be introduced (c4);
- The ability to determine the purpose of changes (c5);
- The ability to cope with problems arising during the process of change on the part of consumers/customers (c6);
- The overall quality of the change process (c7);
- The ability of supervisors to provide workers with information on planned and ongoing changes (c8);
- The ability to determine the benefits accrued from the changes (c9);
- The ability to determine the reasons for the changes (c10);
- Facilitating and enabling the flow of information (c11);
- Applying a clearly defined model for the implementation of the changes (c12).

The criteria that respondents recognized as the most important were the ability to solve problems arising from resistance on the part of workers (c3), accuracy in terms of determining the costs associated

with the introduction of changes (c2), and the ability to define the benefits of change (c9). The lowest importance was assigned to the existence of a clearly defined model for the implementation of the changes (c12).

3.1. Map of the Change Process Quality

The map of the change process quality allowed for the determination of those aspects of the process of change which should be improved, adjusted, eliminated in the first place, or that did not require correction.

This map is shown in the diagram below (Figure 1). The individual analyzed features were assigned to four groups:

- Less important aspects, highly rated, which require correction;
- Less important aspects, low-rated, which do not require correction;
- Very important aspects, low-rated, which require correction;
- Very important aspects, highly rated, which do not require correction.

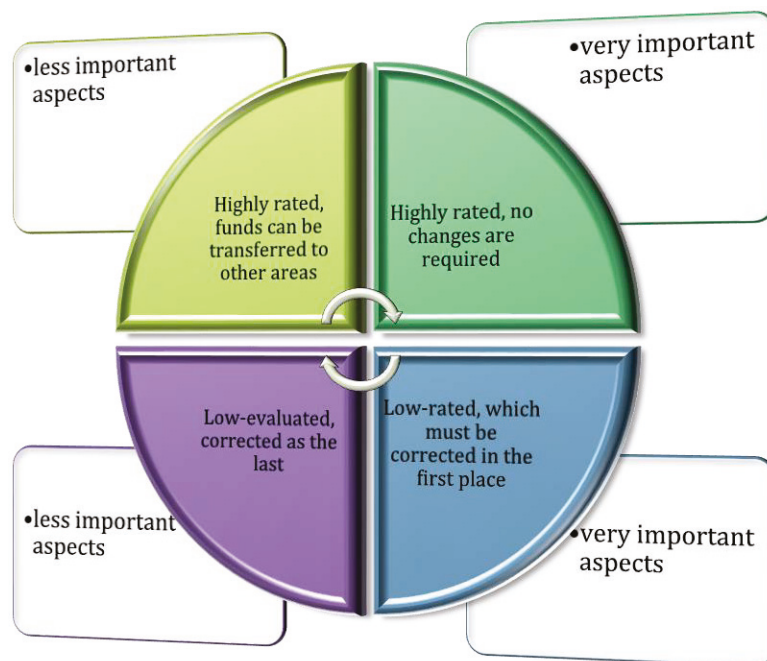


Figure 1. Quality map of the change process.

In Figure 2, the vertical axis presents the company's ability to change (in the opinion of employees), while on the horizontal axis there is the validity of the criterion. The four fields are determined by the intersection of vertical lines drawn from the point, which determines the average importance of each assessed criterion and the horizontal lines, which originates in the designated WZZ ratio.

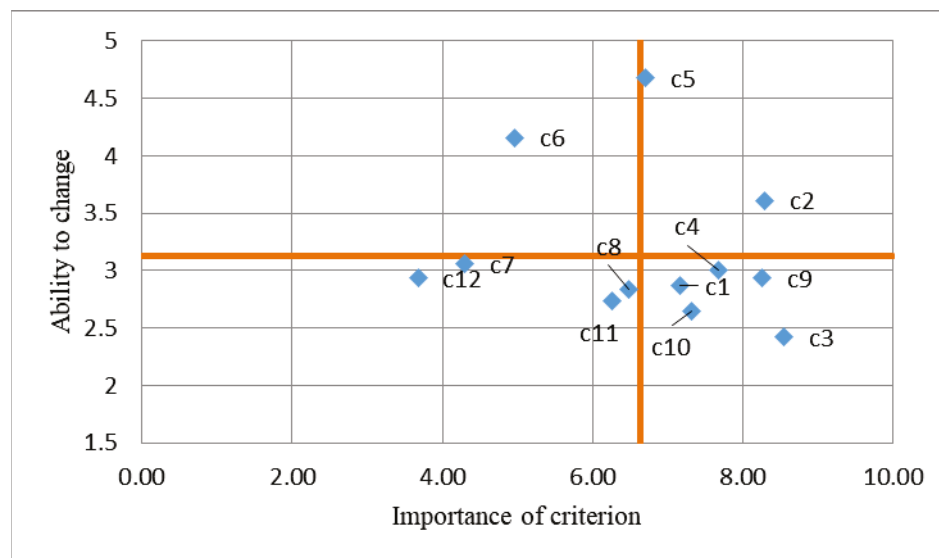


Figure 2. Dependency of the ability to change on the importance of the criterion (Stage 1).

Factors that should not be changed were the ability to determine the purpose of changes (c5) and the determination of the costs related to the introduction of changes (c2). The company should devote a lot of attention to these factors and should maintain at least this status quo. The respondents recognized the ability to cope with problems arising during the process of change on the part of consumers/customers (c6) as the factor that was the least important of all investigated factors. This was characterized by the highest value of the ability to change. Therefore, the resources allocated so far to factor c6 could be used to improve other factors. There was only one such factor, which confirmed that they were properly matched. The fact that it was an aspect not linked to the internal working environment and that in the enterprise there were many other important issues was the reason why the attention of the respondents was primarily focused on this area. Factors that are very important and should be corrected first are the most numerous groups. These were: The effectiveness of changes (c1); the ability to solve problems arising from resistance from workers (c3); the ability to determine the point at which an enterprise must perform the given change (c4); the ability to define the benefits of any change (c9); and the ability to determine the reasons for changes (c10). All factors indicated that during changes in mining enterprises, executives did not devote enough attention to employees. Employees experienced strong emotions during the changes, and these affected their performance of the tasks assigned to them. A team can work incredibly productively or extremely inefficiently. Employees also noted that the process of designing and implementing changes in their organization was not carried out with due diligence, using professional tools and methods (By et al., 2018). This caused a lot of negative emotions, such as distrust, discouragement, and fear, resulting in a decrease in labor productivity.

Factors which could be improved later in the process were: The overall quality of the change process (c7), the ability to provide workers with information on planned and ongoing changes (c8), facilitating and enabling the flow of information (c11), and the use of a clearly defined model of change (c12). The level of the WZZ indicator is usually compared to the industry benchmark. In this case, no such benchmark has yet been set. The results could be compared only with a maximum value, i.e., 10. The total value of the ability to change indicator (WZZ) was, in this case, 3.15, i.e., 31.5%.

Stage 2

In the second stage, the workers were asked to evaluate the ability to change in their companies in the fields of:

- The production costs (c1);

- The efficiency of coal mining (c2);
- The level of production allocated to the variable during the year demand for hard coal (c3);
- The survival of the company in a turbulent environment (c4);
- Maintenance of financial liquidity (c5);
- The level of employment (c6);
- The coal production system (c7).

The most important factor (Figure 3) was the survival of companies in a turbulent environment. The least important was to maintain the current system of coal production (c7). Respondents placed the factors into two categories. The first were those factors of great importance that required immediate improvement, such as: The survival of companies in a turbulent environment (c4), the production costs (c1), the performance of coal mining (c2), and liquidity (c5). The second group of factors were those of lower importance, on which the enterprise could devote fewer resources. These were the level of mining adapted to the variable during the year demand for coal (c3), the level of employment (c6), and the system of coal production (c7). Analysis of the graph above (Figure 3) shows that employees were ready for changes. They agreed to introduce changes even at their own expense. Maintaining the level of employment was not the most important aspect for them (c6); the survival of the enterprise (c4) was much more important. The c6 indicator was placed in the less important aspects category, and the c4 indicator in the very important aspects category. The WZZ ratio value was 3.72, i.e., 37%. The designated ratio (WZZ) in both cases oscillated in the range 31–37%.

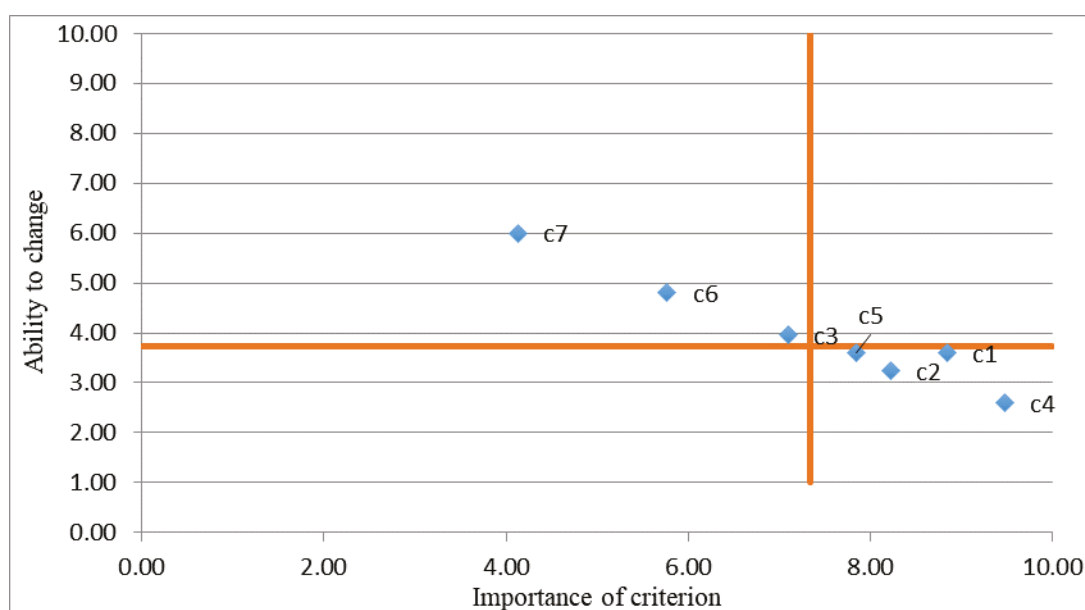


Figure 3. Dependency of the ability to change on the importance of the criterion (Stage 2).

3.2. The Efficiency of the Institutions in a Period of Change

In a period of change, a company is usually characterized by turbulence associated with the level of efficiency [41]. Undoubtedly, the greatest impact on the occurrence of this phenomenon, the so-called performance dip, is felt by employees. They are forced to get used to the new situation, while they are involved with the introduction of the given changes and thus obliged to establish new ties of cooperation, because pre-existing ones have been disrupted or broken as a result of the introduction of the transformations. These problems are not only psychological but also apply to other aspects in the workplace, e.g., the need to acquire new skills and knowledge. This finding is consistent with the learning curve. The more often any process or operation is executed by a worker, the more proficient they are, and the less time is required [42–44]. The efficiency of an organization is also reduced due

to the expense associated with making changes. These are mainly the costs of upskilling, research, development of the change project, and new technical equipment.

Figure 4 shows the curve for organizational efficiency during the period of organizational change. At the time when the change increases, the efficiency decreases, creating a hole between points 0 and B. In the time interval, A–B occurs so-called repair. The performance returns to the level before the change was introduced. Range B–C shows the period in which the change starts; that is, the desired estimated level of institutional efficiency is reached. The last phase is the exploitation, i.e., to derive the positive effects achieved as a result of the changes. The figure indicates the maximum acceptable level of organizational efficiency decrease and the maximum delay time for the effects of change. The performance dip occurs regardless of the correctness of the change process. It is inevitable. The team introducing the change can impact the depth of decline in efficiency and the duration of its persistence [46]. In order to determine the efficiency, the organization must try to identify the correct indicator. There are three main groups of factors. The first one is the degree to which the objective is implemented—a specific indicator has to be designed to suit the requirements of the organization and its goal. The second indicator is quantitative—which can include the income, profitability, level of liquidity, production, sales, market share, quality, timeliness, cost of operation (including the cost of designing and implementing the change), the time and expense of information flow, efficiency, and the use of resources. The last factor is a quality—such as the use of knowledge and skills of employees, work discipline, health and safety conditions, the level of employee satisfaction and their attitudes, human relationships, the level of employee creativity, the flexibility and adaptability of the company, its image, and resistance to internal and external pressures [47].

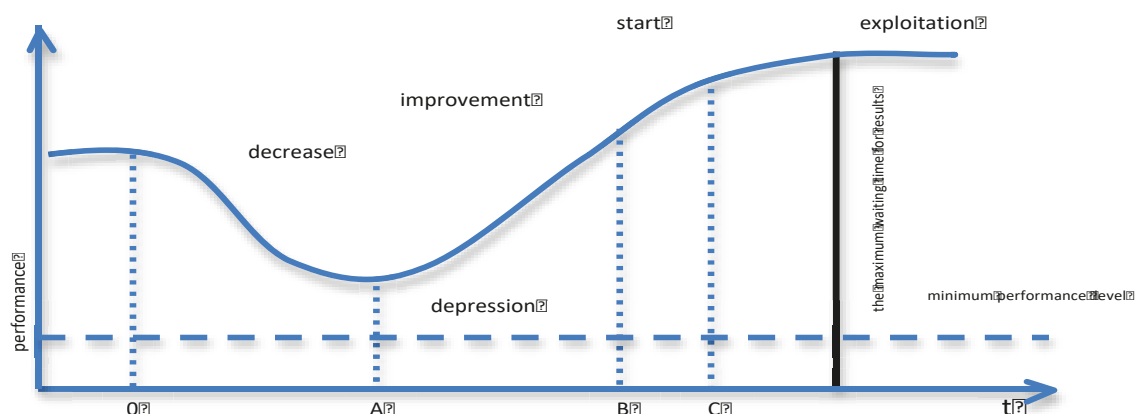


Figure 4. The efficiency of the institutions in the period of change. Source: own, on the basis of [45].

We assigned a criterion for assessing the efficiency of the company during the process of change. For this purpose we used following measures assigned to three areas: Economic—including the costs of production, storage, liquidity, operating profit, and the profitability of processing; social and environmental—which took into account the stability of employment, job security, and the coal exploitation method; and the last—customer satisfaction, which included the continuity of supply, quality of service, production, and the price of coal.

The criteria were initially chosen based on a study of the literature [48–50]. The collection was finally checked during the expert survey.

Coefficients of variation were also calculated for each of the factors presented in Table 1. The coefficients determined the level of the diversity of the respondents' opinions. It was assumed that if the coefficient was less than 25%, the opinions of experts regarding the analyzed phenomenon were considered consistent. The value of the examined indicators in only one case slightly exceeded the value of 25%.

Table 1. Efficiency of mining companies' assessment of criteria.

Criteria	Weight	Coefficient of Variation
Financial liquidity	0.12	11.81%
Production cost	0.11	9.80%
Occupational safety	0.11	8.40%
Price	0.10	9.72%
Profitability of processing	0.09	18.41%
Coal exploitation method	0.09	17.20%
Operating income	0.09	10.02%
Continuity of supply	0.08	24.81%
Employment stability	0.08	26.11%
Quality of service, production	0.08	16.20%
Costs of storage	0.06	14.49%

The respondents recognized the liquidity and the cost of coal production as the most significant and noteworthy criteria for assessing efficiency. Therefore, it was mainly the level of these two measures that should be taken into account in determining the efficiency of the organization during the period of change, i.e., the maximum reduction in the efficiency of the organization and the time required for the occurrence of the positive effects of the changes. For each company, there are individual values, which must be determined by the change design team.

The survey was validated using the content validity index (CVI) in two variants, I-CVI (for item) and S-CVI (for scale), and the kappa statistic [51–54]. The kappa statistic complements CVI because the CVI indicator does not take into account the possibility of overstatement due to random compliance. A kappa value above 0.74 is considered excellent. For CVI, the acceptable cut-off score is 0.78 value [55]. The survey reliability was assessed using Cronbach's alpha measure. Its value ranges from 0 to 1. It is assumed that the recommended value of the indicator is minimum 0.65 [56,57]. This particular set of indicators was chosen mainly due to the very easy and clear interpretation of the results [58]. Table 2 presents the outcomes of conducted validation. Most indicators reached values that indicated that they are at an excellent and good level. Only in the case of the CVI designated for Stage 1 was the indicator slightly below the limit of acceptability. However, it should be remembered that as the number of experts increases, the value of that indicator may decrease. Therefore, the K statistic was additionally determined. In the case of a large number of respondents, the CVI and Kappa values also became convergent, which can be seen on the basis of the presented research. Ultimately, it can be stated that the proposed instrument was characterized by an appropriate level of content validity and reliability.

Table 2. Survey validation indicators.

Measure	Stage 1	Stage 2
Validity		
I-CVI	0.72	0.80
S-SVI	0.72	0.80
K	0.71	0.79
Reliability		
Cronbach's alpha	0.75	0.90

4. Conclusions

Enterprises in the 21st century are functioning in an incredibly unstable environment, called the era of turbulence. The main influences for the instability stem from globalization, the global economic crisis, exchange rates, and the prices of raw materials and fuels. Thus, it is important to respond to changes as rapidly as possible. If a company manages to outperform its competition, it will be possible to transform changes into success. Such changes also take place in the market in which Polish mining companies operate. Decades ago, the uncertainty of the environment was limited to grades 1 and 2 on a 4-point scale [59]. Currently, we are increasingly faced with points 3 and 4. This makes the management methods used so far by Polish mining companies ineffective. The environmental conditions in which mining companies operate and the constant changes in the coal demand mean that decisions are made under conditions of huge uncertainty. Polish mining companies do not have the ability to react immediately to changes in the environment. The reason for this is the inflexible structure of management and production. A suitable solution in this situation may be a change of management principles. This was demonstrated by verifying the level of changes planned in Poland since the 1990s and introduced in the form of the implementation of a number of restructuring programs. The authors noted that the main objectives of these programs were not implemented. First of all, any growth of labor productivity and lower production costs has not been achieved. That this has failed to introduce the desired changes was confirmed by the authors of this article using the production function, seasonal decomposition of the hard coal production, and the sales time series [1].

Results obtained during the analysis presented in the article are useful at the following stage of building the company's strategy: Determining the vision and mission of the company because it is necessary to specify organization goals. At this stage it is crucial to eliminate the disadvantages of the change management process detected using the methods outlined in this article. This is closely related to the analysis of the company, and its strengths and weaknesses (for example, human resource potential research, employee morale). It makes it easier to determine the correct overall goal of the enterprise that the strategy is designed to implement. Results can also be used at the preparation of enterprise development scenarios stage, formulation of strategic tasks, and evaluation of the chosen strategy, as was done in the first part of the article. Analysis result can be helpful during the construction of a strategic plan supplemented with actions aimed at eliminating irregularities detected using the presented quality map.

Such strategies can contribute to achieving the main objectives set by the mining industry restructuring policy. To detect the main causes of these failures, the authors analyzed the ability of mining enterprises in Poland to change. For this purpose, an ability to change indicator (WZZ) was created. The WZZ indicator achieved only an average level of 30%.

The analysis allowed for the determination of the causes of a low level of ability to change. Principally, these were the mining enterprises' lack of experience in change management and a lack of executive conviction about the need not only for proper management of the process of change, but also for change in general. The problem was also a lack of adequate knowledge, experience (competence) in the field of change management, and communication with employees and building employee trust. Low level of ability to change was caused by the inflexible organizational structure, the organizational culture, a lack of motivation, and the limited flexibility of the human factor. Coal companies are also struggling with reluctance to delegate responsibilities and the specialization and high level of formalization of the company. Readiness to change was limited due to the specifics of the technology used and the exploitation techniques (technological flexibility), low organizational flexibility (limited ability to adapt the organizational structure to the turbulent environment), and resistance to questioning the way the company functions.

Only by the appropriate identification of a problem's causes will it be possible to introduce appropriate remedial measures. Errors can be quickly specified. This, in turn, will enable the appropriate changes within the company.

Author Contributions: Conceptualization, methodology, software, validation, formal analysis, investigation, writing—original draft preparation, writing—review and editing, funding acquisition, A.R. (Aurelia Rybak) and A.R. (Aleksandra Rybak). All authors have read and agreed to the published version of the manuscript.

Funding: This publication was supported under the Silesian University of Technology Rector’s pro-quality grants in research and development 86/010/RGJ20/0041 and 06/010/RGH18/0031.

Conflicts of Interest: The authors declare no conflict of interest.

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