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Safety and Work Organization Management in the Early Days of the COVID-19 Pandemic in the Lignite Mining and Energy Sector in Poland

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Abstract: The paper presents the results of sociological qualitative research on safety management in work organization. The focus was on how to adapt the workforce to the sanitary regime during the time of the COVID-19 pandemic in the lignite mining and energy sector in the Bełchatów powiat (Łódź voivodeship, Poland). The study aimed to identify the dimensions of safety and the work culture created in crisis conditions as perceived by workers. Based on the conducted analysis, the process of adapting employees to the new rules of work organization was reported, including the transition from fear and anxiety to control over threats and negative emotions. The essence of the research was to support institutional memory to consolidate the existing knowledge and use it in the future.

Keywords: COVID-19; pandemic; work safety; remote work; hybrid work; interpersonal relations



Citation: Kamińska-Berezowska, S.; Suchacka, M. Safety and Work Organization Management in the Early Days of the COVID-19 Pandemic in the Lignite Mining and Energy Sector in Poland. *Energies* **2022**, *15*, 4239. <https://doi.org/10.3390/en15124239>

Academic Editors: Jereb Borut, Justyna Żywiołek and Joanna Rosak-Szyrocka

Received: 25 April 2022

Accepted: 3 June 2022

Published: 9 June 2022

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1. Introduction

Work in the mining and energy industry is so specific that there have been several scientific studies describing its distinct character. In Poland, professional research teams working on this subject include primarily social researchers from Upper Silesia, as it is an industrial region where mines and power plants are inseparable elements of the landscape. Interesting research threads in the field of sociology and management of interpersonal relations can be found in works on the restructuring of mines, the Silesian work ethos, transformations of the industrial region, or the importance of women in the trade union movement [1–4].

Unpredictable outbreak of the pandemic. (COVID-19) has had a major impact on all sectors of the economy and interpersonal relations. The energy sector as the basic industry of economic development, along with the mining sector, are facing serious problems due to the global pandemic [5,6]. They concern changes in demand, price, employment, government policy, countermeasures, and research [7]. The events of the COVID-19 pandemic quickly and unexpectedly affected mining, which is one of the pillars of global development [5]. Experts decided that it was therefore the right time to intensify work on solving climate problems and transition to clean energy.

The restructuring processes of mines and power plants have always caused a number of social problems and consequences for the natural environment. On the other hand, more companies engage in generating and implementing energy-saving innovations, which is crucial for balancing energy needs for sustainable development. Reducing energy consumption can solve environmental problems and lower production costs as well as costs related to compliance with regulations [8]. Descriptions of innovative applications of various types of mechanisms enhanced by artificial intelligence for energy efficiency as well as occupational health and safety can be found in the literature. Managing the balance between energy efficiency and occupational health and safety can lower a company's

annual energy costs worth millions of dollars, optimize environmental conditions, and improve health and safety for all employees and stakeholders [9]. However, this translates into a change in employee relations and the method of knowledge management in a specific organization, such as a mine or a power plant. Various analyses show that “a negative perception of mining activity by the society is now a serious problem for the development of opencast mining (. . .) therefore the mining industry should make fundamental changes in the field of communication with the society (. . .)” [10]. Considering the mining and energy industry in Poland in the Bełchatów region, and in connection with the planned transformation, a synthetic study [11] raising the aspects of the current development and the future of this industry was prepared. The authors of the report aimed to describe the state of preparation of the region for the energy transformation by conducting qualitative research presenting the perception of this issue via the opinions of three categories of respondents: local government officials, mine and power plant employees, and the social side (i.e., residents and other workers in the region). The researchers conducted their research during the COVID-19 epidemic but did not emphasize its role in the research at all. They focused on the issues related to the transformation of the region due to the depletion of deposits and the negative effects of the energy complex in terms of the ecology and environment. The outbreak of the COVID-19 pandemic clearly showed the importance of social aspects of work organization and their consequences on the employees’ environment. The paper focuses on the social dimension of management in the specific conditions of the pandemic, where the responsibility of the employer for the transferred knowledge and information on the organization of work in previously unknown conditions is special. It translates into the quality of work and the sense of safety of the employees. However, the main focus of the fight against the COVID-19 pandemic was reduced in the first place to the development of new rules for managing safety and work organization at the beginning of the pandemic.

The presented research concerns the broadly understood management of occupational safety in KWB (*lignite mine*) Bełchatów and Bełchatów Power Plant during the first wave of the COVID-19 pandemic in Poland.

Therefore, the aim of the study was to determine the scope of employees’ perception of the level of safety in the work environment as a function of changing social relations in pandemic conditions among employees of the collective production unit—the mining and energy industries. The main motivation for such a comprehensive analysis was filling the research gap and striving to expand the knowledge base in the field of the management of knowledge and information on occupational safety in unprecedented pandemic conditions. The main research question was formulated as follows—what were the main steps of the management in terms of changes in the organization of work, health safety, regulation of interpersonal relations, and contacts in the situation of the COVID-19 pandemic during its first wave? This question was linked to more detailed questions on specific forms of work, perception of remote and hybrid work, as well as economic security. Due to the qualitative nature of the research, the answer to this question is obviously not quantitative but shows the categories in which the analyzed issues are perceived by the respondents [12]. It was assumed that occupational safety would be studied not only in the context of health conditions allowing for protection against coronavirus infection but also in terms of economic security, cyber-security, as well as in terms of communication and interpersonal relations.

The paper is structured as follows: the next part presents the research methods, their specificity, and a description of the research. The following part presents the results of the research on changes in work organization, health safety, interpersonal relations and contacts, perception of remote and hybrid work, as well as work in terms of economic security. The paper is completed with a discussion and conclusions that also include future research plans.

2. Research Methodology and Description of Research Area

The “Bełchatów” coal mine (KWB “Bełchatów”) and the Bełchatów Power Plant are the main employers in the region of the Bełchatów powiat. Both plants belong to Polska Grupa Energetyczna Górnictwa i Energetyki Konwencjonalnej (PGE GiEK), and the headquarters of the joint-stock company is located in Bełchatów. KWB “Bełchatów” and the Bełchatów Power Plant form one mining and power plant, and its creation was associated with the discovery of coal deposits near Bełchatów in the 1960s. Mining of the first tons of lignite took place in the 1980s and was linked with the operation of the power plant, which, in 1986, became the largest in Poland. In the following years, the mining and power conglomerate experienced its dynamic development, the peak of which was associated with the 1990s, but now, due to the depletion of deposits, environmental issues, and an increase in the price of CO₂ emission allowances, PGE and the Polish government are working on plans of transformation and departure from coal mining, although it is assumed that this process will still be spread over time even until 2049 [11].

The research was conducted in the production unit of the “Bełchatów” Coal Mine (KWB) and the “Bełchatów” Power Plant. The Coal Mine (KWB) “Bełchatów” is one of the largest European suppliers of this energy resource. The Bełchatów Power Plant is the strategic recipient of lignite in the area of (KWB) Bełchatów operations. A dense urban agglomeration secures human resources for an operating production unit. In some analyses, such structures are perceived as examples of a bilateral monopoly [13] (pp. 380–388).

In terms of methodology, the research is a part of the broadly understood qualitative sociology trend. It is not an excuse to conceal anything about the research. In sociological sciences, this type of research has an established tradition and is even their core in many cases. The classic research by Znaniecki and Thomas at the beginning of the 20th century can be mentioned as an example. Znaniecki, the founder of Polish sociology, was one of the first sociologists to analyze personal documents such as letters, autobiographies, and diaries. He considered this form of research as an essential part of the methodology of the so-called humanistic coefficient, i.e., the perception of social reality “through the eyes of its participants” (subjective approach) and not “absolute observer” (objective approach). He contrasted this approach with numerous studies which only provided approximate correlations and could not exclude the exceptions to the rule on a statistical basis. Znaniecki criticized the statistical method, which he did not consider particularly useful in social sciences. He was one of the leading representatives of humanistic sociology, i.e., the scientific trend declaring that human sciences are fundamentally different from natural sciences and require different research methods.

The research is a part of a wider research project entitled “Wpływ koronawirusa na organizację pracy w województwie łódzkim” (“*The impact of the coronavirus on the organization of work in the Łódź Voivodship*”), which was conducted by the OPZZ Council of the Łódź Voivodship within the “Dialog oparty o wiedzę” (“*Knowledge-based dialogue*”) project co-financed by the European Social Fund of the European Union. In accordance with the principles of sociological qualitative research, as well as ethical standards of projects implemented for the EU, in the empirical part, every effort was made to uphold and respect the rights of the individual (related to the voluntary participation in the research process), as well as to provide the auxiliary nature of the research scope (in the sense of broadening the knowledge to improve the problems under consideration), harmlessness (in the sense of respecting the interests of the respondents), and lack of bias (in the sense of paying attention to various social actors, regardless of gender, age or education), while in the part related to the analysis of the research, they were anonymized [14].

As part of the entire project based on sociological qualitative research, a total of 180 individual in-depth interviews were conducted [12], including such sectors as education and science, transport, mining and energy, industry, public services, construction and wood industry, trade, services, culture, and the arts. The qualitative research method in our paper was used purposively, which enabled us to capture the social aspects of new forms of work organization related to the introduction of the sanitary regime and thus

the actual behavior of employees. The research was based on the deliberate selection of the research sample (12), while the decisive selection criterion was working in one of the above-mentioned industries in executive positions (regular or specialist) and in managerial positions (at various levels). The study also included trade union members among the researched workers. It is worth emphasizing that due to the qualitative nature of the research, only research questions were addressed, but no hypotheses were proposed [15]. The basic research question on which the research focused was how the experienced change in the organization of work was perceived in the era of the first wave of COVID-19 by employees in selected companies in the Łódź Province. Therefore, it was not so much about presenting new forms of work organization related to the introduction of the sanitary regime, but primarily about capturing the social aspects of these changes, i.e., the actual behavior of employees (including whether and how the new rules were perceived and applied in practice by company employees). It should also be clearly emphasized that in these considerations, only a fragment of a wider research project is presented, and this part relates to the mining and energy industries. Due to the qualitative nature of the research, the presented analysis does not include numerical data, but the categories of identified problems and the demographics of the respondents from the mining and energy sectors.

The technique of individual in-depth interviews in which employees of the mining and energy industry spoke freely was used to collect the research material. These analyses are based on 23 individual in-depth interviews conducted in the largest lignite mine in Poland and in the related power plant. There were 13 interviews with people employed in and related to work in mining, and 10 with people working at the power plant. Both categories of respondents were studied using the same research tool. Due to the masculinized nature of the industry, the survey was definitely dominated by men—18, compared to women 5. Among the respondents, 2 people had vocational education, 9 people had secondary education, and 12 people had higher education. Older age groups were much more strongly represented among the respondents, i.e., 11 respondents were aged 41 to 50, 11 were aged 51 to 60, and only one person was aged 31 to 40. The demographic data of the interviewees are presented in Table 1.

Table 1. Synthetic presentation of the demographic data of interviewed participants at KWB Bełchatów and Power Plant Bełchatów.

Education	Gender	Age	Employed				
vocational	2	female	5	31–40	1	mine	13
secondary	9	male	18	41–50	11	power plant	10
higher	12			51–60	11		
Total	23		23		23		23

Source: own case study based on data from broader research project entitled “Wpływ koronawirusa na organizację pracy w województwie łódzkim” (“Impact of coronavirus on work organization in Łódzkie voivodeship”).

The analysis of the obtained research material refers to the guidelines of David Silverman [16], including the funnel structure he raised, which allows for perceiving problems by individual respondents, as well as the resulting more general model of changes (which in the case of this research was “taming fear”). The interviews were conducted on the basis of previously prepared instructions in the form of open questions. Each time they were audibly recorded and then transcribed [14]. In terms of the methods of content analysis, the respondents’ statements were coded following the grounded theory methodology, in which the use of computer data analysis programs was not indicated as necessary. On the other hand, it was necessary to constantly compare fragments of the respondents’ statements and assign to them the subjective meanings of perceived phenomena discovered in them as Znaniecki once indicated, and which is indicated by contemporary researchers [17]. The event-by-event coding strategies were precisely applied, with special attention to the sequencing of statements. As a result, the problem of rationalizing COVID-19 threats was

noticed, as well as a general model of changes in the perception of its experience, the extreme poles of which were determined by the stage of shock and fear and the stage of taming following the adopted patterns of adaptation.

At the time of the research, which was performed between March 2020 and April 2021, the population of the Bełchatów powiat was about 113,000 (people aged 55 to 64 were the largest group), and KWB “Bełchatów” and Bełchatów Power Plant were the main employers in the region. By assumption, the presented qualitative research is not addressed at a large number of participants and is usually based on non-probabilistic methods of research sample selection, which was also the case in this research. Therefore, the analyses conducted here only refer to a part of the PDI (personal deep interview) performed on the basis of the purposive research sample selection [12]. However, this relatively small research sample does not mean that it was not saturated, i.e., that it reaches the level that allows for recording the point at which subsequent interviews only reproduce previously obtained information and add nothing or the elements that are insignificant for the problem analysis [17]. Precise repetition of the topics discussed in the interviews is a decisive factor in the saturation of the research sample. In the analyzed case these were the types of social behavior concerning protection against infection. In the initial stage of the pandemic, low-technology security was used, which means that the approach to using masks, disinfectants, or social distance was important. The respondents were asked to present their experiences of working in the conditions determined by organizational changes caused by the COVID-19 pandemic and the new situation in the field of broadly understood security management. The possibility of recording and showing the emotions experienced by the participants of the research that accompany work in conditions of epidemiological risk was also really interesting.

The research was based on qualitative methods which should be used to analyze poorly recognized phenomena [18]. The COVID-19 pandemic in Poland and the related changes in the organization of work were in fact unprecedented phenomena in the history of the country’s economy after 1989. In this context, however, one may wonder to what extent the outbreak of the analyzed pandemic can be defined as a “black swan”, and therefore an unpredictable and truly unique phenomenon, and to what extent, the coronavirus was a systemic catastrophe, i.e., possible to forecast, even though without the possibility to predict an accurate time of the outbreak of the pandemic or indicate its character [19]. The perception of the same epidemiological, technological, or political disasters may therefore be different. The essence of the research discussed here was to reveal the subjective sense and meanings of statements of various categories of employees on the same issues regarding the emergence of new conditions for work performance in the event of the risk of the COVID-19 pandemic. Thanks to the use of qualitative research methods it was possible to reach a description of the perception of ways of experiencing the changes that were taking place and to define their character, without imposing anything on a standardized questionnaire. Applying a qualitative method is proof of an innovative approach to the studied social reality. The presented part of the research on the mining and energy industry may be an inspiration for further in-depth quantitative research and for researchers from other sciences.

3. Research Results

After analyzing the statements of the respondents, it was found that they could be grouped according to the perception of broadly understood security. In the pandemic situation, employees perceived overall safety in the work environment through several dimensions presented in Table 2.

Table 2. Major dimensions of the analyzed problem.

1.	Change in work organization—sanitary regime,
2.	Health safety challenges in interpersonal relationships and contacts
3.	Creating new organizational forms of employment security—organization of remote and hybrid work
4.	Economic security challenges.

Source: own case study based on data from broader research project entitled “Wpływ koronawirusa na organizację pracy w województwie łódzkim” (“Impact of coronavirus on work organization in Łódzkie voivodeship”).

3.1. Change in Work Organization—Sanitary Regime

In the opinions of the respondents, changes in the organization of work in the mining and energy industries in the initial stages of the outbreak of the pandemic were quite easily noticeable. The employer introduced changes to the organization of work in the company mainly by adjusting working hours, painting lines for traffic and distance lines in administrative buildings, developing schedules for the use of machines and excavators, installing sanitization gates, and purchasing hygiene products and masks. The liquidation of employee transport in favor of private transport caused many misunderstandings and fears. Employees often did not take their colleagues in their cars because they were concerned about possible pandemic contact on the part of the passenger. Moreover, the employer selectively reimbursed the amount for transport due to work. This was the cause of many conflicts and claims. Among the typical statements about changes in the organization of work, the following can be indicated:

- It is a plant that employs 4000 people, it is a three-shift job. Working hours have been changed, some shifts have been changed or shortened. We work in the so-called contact, people change in work-places, so to prevent contact between them, the working time has been reduced from 8 to 7 h for first-shift workers. They came to work at 7.30 instead of 7.00 and left at 2.30 p.m. instead of 3.00 p.m., and of course, all the sanitary restrictions that have been introduced, such as the use of masks. Drivers who take employees to other workplaces were separated from passengers with plastic barriers in the car. Like I said, the masks were introduced from day one, as well as more disinfectants, PPE and surface disinfectants were used. (i.1/g) (*The designation of the individual interviews corresponds to the number of the interview conducted with the respondent in the mining and energy sector*).
- A lot of things have changed. In general, thermal imaging cameras which monitor employees in terms of temperature have been installed at the entrance to the plant, all rooms and corridors are equipped with disinfectants, and there is also an obligation to wear masks on designated communication routes. Until now, most of the employees have used company transport, and at the moment most of the employees use private transport. It is worth saying here that the employees are disappointed that the plant has selected employees who are better or more needed for the plant and reimburse them for travel by private transport, while it does not reimburse these costs to other employees who are also concerned about their safety. (i.13/g).

The presented interviews show that it is not enough just to formally introduce the very procedures of the sanitary regime, but it is also trusting in their feasibility and rationality. Concerns or even fear regarding the possibility of transmitting the infection from other colleagues and the actual compliance with the sanitary regime, especially in the first period of the first wave of pandemic, were strongly emphasized. The discomfort and reasonableness of wearing masks during manual work, especially with additional health burdens (e.g., asthma or allergy), were raised as actions difficult to perform in the long term. The lack of clear messages from public media and the behavior of political authorities, whose representatives did not always follow their own sanitary recommendations, were

also emphasized. It was discouraging and caused disinformation. Examples of situational barriers related to the application of new sanitary rules for tasks, the implementation of which required collective effort and the use of shared equipment, were also noticed and indicated in the statements of the interviewees. The respondents also pointed to changes in compulsory periodic training and medical examinations, often performed remotely.

3.2. Health Safety Challenges in Interpersonal Relations

The respondents expressed very positive opinions about the concern for the cleanliness of common rooms and the observance of personal and collective hygiene. They showed an understanding of the necessity of personal and workplace disinfection. Chemical protection substances provided by the employer, such as personal disinfectants, soaps, surface disinfectants, were helpful here. Health safety was also secured by flexible solutions related to the time of starting and finishing work, as well as by the use of dispersion of interpersonal contacts.

The security of communication and interpersonal relationships in the COVID-19 pandemic was significantly disrupted. In this sense, it was a social disease whose sudden onset affected interpersonal relationships. Freedom of contact became the subject of externally stimulated limitations, but it was also significantly minimized at the individual level. The social life and social contacts of employees were reduced to the immediate environment, which was observed and respected, at least initially, also on a subjective level, including the one related to spending holidays or non-working days. Despite the concerns, the professional functioning of employees, especially in the real environment of workplaces, influenced their gradual adaptation to the new situation. The interviews showed that the new rules of the sanitary regime were treated as a kind of “guarantee of safety”. Therefore, the interviewees believed that thanks to the sanitary regime they had a sense of control over the pandemic, because they knew what to do to handle it. The research did not analyze the actual state, but only the declared one, and in this respect, a clear transition from the stage of shock and fear to a certain “familiarization” of the pandemic was noticed. It can be said that in fact the communication process is the foundation of the relational networks that determine the functioning of the work organization, i.e., it influences the integration of employees and their consolidation around common goals. Bad communication in a corporation has a serious impact on the organizational culture, and thus on its environment, and disturbing indicators of excellence, such as productivity and quality [20]. In this sense, corporate communication should be seen as a central dimension for “intelligent organizations” and not a tool of instrumental utility [21]. The respondents’ statements showed that there was concern about the violation of the communicative role of work, freedom of interpersonal relations in the company, and the need to protect relational resources with the use of new procedures of the sanitary regime. Typical examples of perceiving and experiencing these changes included the following:

- At the beginning, for 3 months, there was a lot of fear; in our company you go to work on the machine used by someone before and then people rebelled. They said, “I will not go”. There was a time when there was a lot of fear, now there is less. To operate my excavator, 6 people are needed, if two are out, they have to be replaced and the other people were afraid of who would come, whether they would infect them; people are afraid of such situations, because they will bring diseases home. Everyone has such fears because they do not know how they will eventually be affected by coronavirus. (i.3/g).
- It’s a limitation of contacts, that’s for sure. Confidence is lower, people don’t shake hands, limit greetings, keep distance, and if they don’t have to meet in person, they don’t meet. Perhaps not in the sense that the atmosphere is worse, but that everyone tries to limit these contacts to keep other people safe as well. (i.15/g).

The behavioral changes noted in respondents’ statements are directly related to the way COVID-19 spreads and concerns related to that. Here, attention should be paid to changes in typical working rituals (greetings, common jokes, ways of spending free time)

and the emotions accompanying work. The emotions accompanying the first wave of the pandemic were dominated by anxiety, and additionally, there was fear of the unknown and closing in small groups (family and workers). There was a decrease in the willingness to cooperate with those who were perceived as people from a distant environment, including, for example, the so-called private car transport to work or home. There were also concerns related to transport and contacts with outsiders as well as random people, and sometimes even working in one's own team without keeping social distance and the sanitary regime. Overall, this type of employee disintegration could not be beneficial to the creation of an enterprise community, the exchange of views and opinions, and the functioning of trade unions. However, from the present perspective and from the entire conducted research project, it can clearly be seen that gradually the level of fear and/or anxiety decreased, which, as can be assumed, was also the result of the vaccinations. Thus, in general, the conducted research allowed capturing, on the example of this observed evolution of reactions, a certain universal pattern, i.e., a continuum of emotions from the initial fear and fear of the unknown, through the period of identification of threats, to the feeling of their control related to the "normalization" of threats as usual, ordinary risk.

3.3. *New Forms of Organizational Activities—Perception of Remote and Hybrid Work*

The possibility of remote and hybrid work in its various situationally determined variations was introduced in the analyzed enterprises on a large, previously unknown, scale. The respondents commented on this topic, while emphasizing the strengths and weaknesses of such work. The following typical statements can be cited here:

- We have introduced a very important change, i.e., remote work, and in our case, it is a very helpful option because if I and my deputy fell ill at the same time, it would be a problem. We are now working in rotation, so when I'm at work, he is working from home and vice versa. This means that we are not at work together, i.e., we both work in a hybrid system. The employer has equipped us with cameras, microphones, and loudspeakers, so an employee comes to my office, sits down at the computer, and connects with the health and safety department, or with a firefighter, and on this basis, he completes a periodic health and safety training. (i.2/g).
- Obviously, there is less contact with people, and there is less going to the facilities. It happens only if it's necessary. Site or device inspections are less frequent. More time is spent on office work, of which there is more now. There are electronic signatures at the moment so we can also arrange a lot of organizational matters via the Internet now. (i.8/g).

In this sense, it can be said that the pandemic was a significant impulse to introduce innovation because remote and hybrid forms of work were implemented on an unprecedented scale, at least in the case of some positions. These changes in the forms of work performance also proved to be generally applicable and acceptable in the work culture of companies, including both by those who perform the work and by their superiors.

However, the newly introduced forms of work were associated with new challenges and dilemmas, including, in particular, a clear separation between professional and private spheres, which was not easy when working from home. Many of the working practices that had been developed out of necessity were considered to be worth maintaining in institutional memory and worth continuing in the future. Work on certain types of administrative positions or the use of short remote meetings of employees were indicated among the types of practices for potential future continuation.

In terms of cybersecurity, the interviewees pointed to the functioning of security in the cases of shared laptops with the software running in them. The existence of basic security rules, such as the necessity to use a password to start the equipment to ensure its use only by authorized persons, was pointed out. Generally, employees working in a remote and/or hybrid mode emphasized that IT department employees take care of cybersecurity and that they can report on any problems in this regard.

It was also noticed that remote work requires legal regulations and compensation for the Internet connection, electricity, or private mobile phones of employees, which were used to redirect numbers from fixed-line phones from workplaces in the company. The need for further training in the field of modern computer programs, as well as an increase in the development of remote communication, including the one based on teleconferences, was also noticed. Thus, the pandemic became a great challenge for managers and highlighted the importance of the development of managerial education, although it had also been indicated before [22]. Nevertheless, remote training, which requires manual proficiency in some of the exercises presented in the course, was questioned.

However, work performed in the real environment of workplaces is definitely the foundation of work in the mining and energy industry. In this regard, it was emphasized that care about occupational hygiene, of both personal and collective nature, was definitely worth continuing also after the pandemic. The availability of chemical means of protection and disinfection was also appreciated, however, less attention was paid to barriers of a mechanical nature and maintaining social distance, which, in some types of work, was impossible to observe.

3.4. Perception of Work in Terms of Economic Security

The economic security of employees of the surveyed companies in the era of the first wave of the COVID-19 pandemic was ensured by employment in state-owned enterprises. These circumstances obliged the enterprise to take advantage of the aid offered by the state, i.e., the so-called anti-crisis shields. In this sense, the economic security situation of employees was relatively comfortable, although associated with a sense of uncertainty, which was reflected in the statements of the respondents regarding their subjective assessment:

- When it comes to money, there are concerns that allowances or other additional benefits may be cut. A month ago, everyone was worried about getting a bonus on St. Barbara's day, because unfortunately, this whole pandemic is for the management, for them, because now they can take what they want. As far as I know, there should be a bonus on St. Barbara's day, but what will happen next, we do not know. (i.12/g).
- That's why there are such feelings and concerns about work, there are such reflections that you have to move out of this city because in a moment it will be a city of retired people. All this is more related to the very end of the open pit, and my company and its subsidiaries means about 15,000 people. This will affect the entire region. People from Częstochowa, Piotrków, and Tomaszów come here for work. They're more concerned about the work than about COVID. The problem is with staffing at workplaces due to COVID or quarantines. In our department, out of 112 people, there were 17 people in quarantine. (i.7/g).

Respondents said the pandemic had not yet resulted in layoffs in their industry. There were concerns about the reduction in allowances and other benefits, as well as violations of the punctuality in paying remuneration. It was indicated that there were no problems in obtaining social benefits, although they were somewhat limited by the deficits in the access to collective holiday trips or by the possibility of participating in cultural events. In the interviews, the interviewees emphasized the importance of trade unions actively acting in the industry and the advantages of the collective labor agreement functioning thanks to them, which had a positive effect on the timeliness of payment of basic salaries and wage bonuses in the form of the so-called "Carbon benefit".

Analyses of the sense of economic security of employees during the first wave of the coronavirus also revealed concerns about the restructuring of mining and energy in the Bełchatów region. These were concerns not related to COVID-19, but to the anxiety caused by the vision of the future of the plant in the context of the lack of extension of the license to exploit coal deposits. In the opinion of the respondents, the actions implemented by the mines in this respect were related to taking the advantage of the pandemic for the purpose of employment restructuring. The amount of formal working time did not change, although there were changes in the working hours or changes brought by planning remote

or hybrid work. Due to these new forms of work, difficulties also occurred in employee contacts and direct interactions. Among the improvements of remote and hybrid work, attention was paid to the greater use of electronic signatures, which facilitated the flow of documentation.

4. Discussion

In the presented research, in the context of the coronavirus, safety issues in the work environment were simply understood primarily as the ability to avoid infection. Due to the nature of the work, the discipline of employees in the mining and energy sector is very high. Hence, there was so much faith in the absolute necessity for all employees to comply with the imposed sanitary regime and faith in appropriate state and employer support in limiting the possibility of COVID-19 infection. The principle of compliance with state obligations, company obligations, as well as employee duties, was in force. The role of the state was to establish state rules in the field of conduct, legal regulations, and restrictions in a pandemic situation. Hence, the obligation to wear protective masks in places of a high density of people and greater social distance. The entrepreneurs were faced with new obligations developed by the state with regard to the implementation of all recommendations of individual sanitary protection, i.e., increasing the distance between employees while performing their work, safety in the work environment, providing personal protective equipment to employees, and disinfecting liquids for personal and the workplace disinfection. The employee, on the other hand, was absolutely obliged to follow the established internal procedures of the workplace, maintain the sanitary regime, personal hygiene, and hygiene at the workplace, and keep social distance. All these determinants constituted a specific and rigorous “novelty” for both enterprises and employees and were briefly marked as 3D (Distance–Disinfection–Discipline). These increasing concerns are a stark reminder of the importance of health and safety [23] which will likely become an even more important part of the research agenda in the future.

The employer used these circumstances to develop further procedures to reduce the spread of COVID-19 and improve the broadly understood safety of employees. The presented analyses showed that the new rules for the organization of work based on the sanitary regime were filtered by the previous experiences of employees and their belief in the sense of the new principles for employee interests and the desired individual effects. The respondents emphasized not only the necessity to perform all tasks in the real environment of enterprises but also noticed new types of security, which in the research were classified as collective and personal, chemical, available collectively and individually, and purely organizational, associated with a wide application of remote or hybrid work. The respondents attributed especially positive significance to the hybrid form of work performance, at least where it was noticed and clearly distinguished from the remote one. The personal example of the managers, which was part of the cohesion policy, also proved to be very important. The personal compliance of the management and authorities with the established sanitary rules was therefore mobilizing, and the shortcomings of this type of consistency were noticed, stigmatized, and had demoralizing effects. The pandemic situation forced the employer to change the organization of work to such an extent that, by dispersing employees, the effect of reducing the number of interpersonal contacts would be achieved. It was aimed to limit the transmission of the virus. However, the spatial dispersion of employees also had a negative impact on work efficiency, interpersonal relations, and the integration of the company’s employees. The spatial dispersion of employees and the reduction in interpersonal contacts were compensated by providing them with computer equipment and appropriate editing programs and communicators. This improved relations and the feeling of security, as well as enabled the organization of video conferences. In addition, it allowed some of the employees to work remotely. This situation significantly contributed to mastering digital management tools and the use of computer hardware for business contacts and the reintegration of teams.

According to the conducted analysis of the research results, a synthetic model of the perception of changes in work organization by the surveyed employees of KWK Bełchatów and Bełchatów Power Plant can be proposed. It is shown in Figure 1.

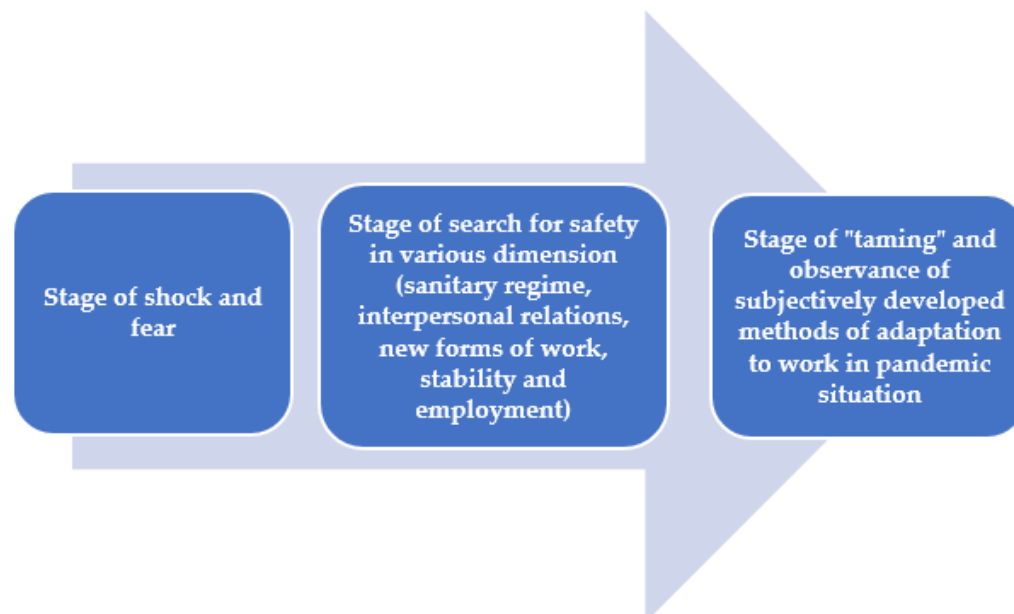


Figure 1. Visual presentation of the model of the perception of changes in work organization during the first wave of COVID-19 by the research participants. **Source:** Own elaboration based on data from a broader research project entitled “Wpływ koronawirusa na organizację pracy w województwie łódzkim” (“Impact of coronavirus on work organization in Łódzkie voivodeship”).

The presented model illustrates the process nature of experiencing changes in the organization of work in the analyzed enterprises. This model is only a general presentation of the importance of employee behavior, and the specific practices and provisions of new, pandemic management regulations implemented during COVID-19 are at the disposal of the managers of the analyzed power plant and mine.

The identified dimensions of the sense of security experienced by workers concern all workplaces, but in the mining and energy sector, they have their own specificity. In mining, it consists of work related to the hazards of coal dust explosion, landslide hazards, fire hazards, hazards associated with the use of blasting materials, hazards associated with rock breaking, etc. In the energy industry there is the possibility of electric shock, dangerous work at heights, starting and synchronizing the operation of electrical devices, and work in an environment of a high electric and magnetic field. In addition, in this regard, the pandemic brought the necessity to maintain and adapt to newly developed procedures. In the world literature, there are more and more new studies on the impact of the pandemic on interpersonal relations, especially on relations in the sphere of work organization. “As the virus spread across the globe in the early months of 2020, we quickly witnessed fundamental changes to our work and social lives” [24].

5. Conclusions

The COVID-19 pandemic was an unexpected and unwanted phenomenon. It forced immediate changes in the sphere of ensuring the management of work organization. They were determined by efforts to ensure the safety of employees and to maintain production or energy traffic. As researchers note: “COVID-19 is shining a spotlight on the need to rethink the future politics of work. In so doing, reflecting on the past is important. Not least because countries vary in their institutional pathways which shape the present and futures of work.” [25]. The possibility of reducing the speed of the pandemic spread depended on an unprecedented scale on the organization of safe work and the dispersion of people-to-

people contacts in the enterprise, as well as strict compliance with the sanitary regime. In these conditions, it was necessary to strictly observe all sanitary rules and to reduce the number of contacts in social relations between employees in the workplace at various levels of business relations. The time of the pandemic also suggestively indicated the role of the state as the organizer of the principles of social life and the importance of systemic rules to support individual industries and their employees in the pandemic period.

In the context of the presented research on the perception of broadly understood security, its multidimensional character and the importance of a work culture based on trust, care for interpersonal relations, and an efficient information policy were indicated.

Therefore, the recommendations resulting from the research lead to continuous efforts to create an organizational culture based on trust and an effective information policy in enterprises.

Forms of remote and hybrid work have become popular on an unprecedented scale, which seems to facilitate the acceleration of digitization processes and the recognition of various aspects of cybersecurity.

The development of new methods of interpersonal communication, remote management of the security of company organization, the economic security of employees, and cybersecurity of employees means that in new and unexpected pandemic conditions, enterprises discovered capabilities of working in crisis conditions. From a team and organizational perspective, these experiences are worth absorbing and preserving for the creation of experiences supporting management in crisis situations. Thus, the new procedures of conduct that emerged in the era of the first wave of the pandemic can be perceived as an added value to the organizational experience of enterprises in the mining and energy sector. Thus, the pandemic situation contributed to the change in the conditions of work safety and the way in which the company is managed. All these conditions occurred unexpectedly, at the same time, and with the simultaneous obligation to apply them by employees. Hence, in every enterprise there was a kind of “pandemic shock”, which, especially in the initial period of the pandemic, was reflected in various negative emotions, conflicts in interpersonal relations in working teams, and divisions, decrease in the frequency of interpersonal relationships, the decline in the sense of security and organizational changes in production management. As a result of the concept of “pandemic shock”, there was an urgent need to understand the emerging challenges of the pandemic and its socio-economic consequences in business, as well as to ensure broadly understood energy and security management [26].

The research presented here was focused on the first wave of the pandemic in 2020 and as such, can provide a database of knowledge about the social system of workplaces in the mining and energy industry in pandemic conditions along with the observed evolution of the behavioral model that has run from an experience of shock and a strong level of concern (even fear) to controlling emotions by developing and applying new rules of a sanitary work regime, and thus a kind of “taming” the virus. The model of the evolution of these social reactions in the industry can be perceived as a reference point for analogous studies already prepared for the period 2022–2023. The essence of these planned research projects is the answer to the question to what extent the experiences from the first wave of the pandemic were organizationally recorded (along with implicit and explicit knowledge) in the institutional memory and actually allow for the efficient functioning of the social part of the enterprise system, i.e., for a constructive systemic response to potential future crisis situations.

Author Contributions: Conceptualization, M.S.; Data curation, S.K.-B.; Investigation, S.K.-B.; Methodology, S.K.-B.; Resources, S.K.-B.; Validation, M.S.; Visualization, M.S.; Writing—original draft, M.S. and S.K.-B.; Writing—review & editing, M.S. and S.K.-B. All authors have read and agreed to the published version of the manuscript.

Funding: The project “Wpływ koronawirusa na organizację pracy w województwie łódzkim” (“The impact of the coronavirus on the organization of work in the Łódź Voivodship”) implemented by the OPZZ Council of the Łódź Voivodship as part of the “Dialog oparty o wiedzę” (“Knowledge-based

dialogue”) project was co-financed by the Operational Program “Wiedza Edukacja Rozwój 2014–2020” (“Knowledge Education Development 2014–2020”) co-financed by the European Social Fund, Priority II Effective public policies for the labor market, economy, and education, Measure 2.20 High-quality social dialogue in the field of adapting education and training systems to the needs of the labor market, in accordance with the co-financing agreement, no. POWR.02.20.00-00-8. In terms of content, the sociological part of the project was coordinated by Ph.D. Sławomira Kamińska-Berezowska. The open access APA fee of the publication was funded by University of Silesia in Katowice (Faculty of Social Science, Institute of Sociology) as a part of the subsidy of the Ministry of Science and Higher Education for research potential.

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

Data Availability Statement: The data presented in this study are available on request from the corresponding author.

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

References

1. Szczepański, M. *Górnicy Górnośląscy—Ludzie Zbędni, Ludzie Luźni?* Andrzej Matczewski Publisher: Kraków, Poland; Katowice, Poland, 1994.
2. Swadźba, U. *Śląski etos Pracy: Studium Socjologiczne*; Wydawnictwo Uniwersytetu Śląskiego: Katowice, Poland, 2001.
3. Suchacka, M. *Transformacja Regionu Przemysłowego w Kierunku Regionu Wiedzy: Stadium Socjologiczne Województwa Śląskiego*; Wydawnictwo Uniwersytetu Śląskiego: Katowice, Poland, 2014.
4. Kamińska-Berezowska, S. *Kobiety w Wybranych Segmentach Polskiego Ruchu Związkowego a Równość Płci. Studium z Zastosowaniem Teorii Pierre’a Bourdieu*; Wydawnictwo Śląskiego: Katowice, Poland, 2013.
5. Gałas, A.; Kot-Niewiadomska, A.; Czerw, H.; Simic, V.; Tost, M.; Wårell, L.; Gałas, S. Impact of COVID-19 on the Mining Sector and Raw Materials Security in Selected European Countries. *Resources* **2021**, *10*, 39. [\[CrossRef\]](#)
6. Zhong, H.; Tan, Z.; He, Y.; Xie, L.; Kang, C. Implications of COVID-19 for the electricity industry: A comprehensive review. *CSEE J. Power Energy Syst.* **2020**, *6*, 489–495. [\[CrossRef\]](#)
7. De Blasis, R.; Petroni, F. Price Leadership and Volatility Linkages between Oil and Renewable Energy Firms during the COVID-19 Pandemic. *Energies* **2021**, *14*, 2608. [\[CrossRef\]](#)
8. Šūmakaris, P.; Korsakienė, R.; Ščeulovs, D. Determinants of Energy Efficient Innovation: A Systematic Literature Review. *Energies* **2021**, *14*, 7777. [\[CrossRef\]](#)
9. Koutroumpinas, P.; Zhang, Y.; Wallis, S.; Chang, E. An Artificial Intelligence Empowered Cyber Physical Ecosystem for Energy Efficiency and Occupation Health and Safety. *Energies* **2021**, *14*, 4214. [\[CrossRef\]](#)
10. Kasztelewicz, Z.; Zajączkowski, M. Wpływ działalności górnictwa węgla brunatnego na otoczenie. *Polityka Energetyczna* **2010**, *13*, 227–243.
11. Dańkowska, A.; Sadura, P. *Przespana Rewolucja. Sytuacja Społeczna w Regionie Bełchatowskim u Progu Transformacji Energetycznej*; Wydawnictwo Krytyka Polityczna: Warszawa, Poland, 2021.
12. Babbie, E. *Badania Społeczne w Praktyce, Przeł*; Betkiewicz, W., Ed.; Wydawnictwo Naukowe PWN: Warszawa, Poland, 2003.
13. Jurdziak, L. Kopalnia węgla brunatnego i elektrownia w warunkach liberalizacji rynku energetycznego. *Energetyka* **2005**, *6*, 380–388.
14. Flick, U. *Projektowanie Badania Jakościowego, Przeł*; Tomanek, P., Ed.; Wydawnictwo Naukowe PWN: Warszawa, Poland, 2010.
15. Creswell, J. *Projektowanie Badań Naukowych Metody Jakościowe, Ilościowe i Mieszane*; Wydawnictwo Uniwersytetu Jagiellońskiego: Kraków, Poland, 2013.
16. Silverman, D. *Interpretacja Danych Jakościowych Metody Analizy Rozmowy, Tekstu i Interakcji, Przeł*; Głowacka-Grajper, M., Ostrowska, J., Eds.; Wydawnictwo Naukowe PWN: Warszawa, Poland, 2007.
17. Charmaz, K. *Teoria Ugruntowana Praktyczny Przewodnik po Analizie Jakościowej, Przeł*; Komorowska, B., Konecki, K., Eds.; Wydawnictwo Naukowe PWN: Warszawa, Poland, 2009.
18. Koster, M. Wprowadzenie. In *Kultura Organizacji. Badania Etnograficzne Polskich Firm*; GWP: Gdańsk, Poland, 2007; pp. 9–20.
19. Afeltowicz, Ł.; Wróblewski, M. *Socjologia Epidemii. Wyłaniające się Choroby Zakaźne w Perspektywie Nauk Społecznych*; Wydawnictwo Naukowe Uniwersytetu Mikołaja Kopernika: Toruń, Poland, 2021.
20. Rincón Quintero, Y. Comunicación Corporativa, Relaciones Públicas y Logística en la Dinámica Organizacional. *Encuentros* **2014**, *12*, 47–58. [\[CrossRef\]](#)
21. Oviedo, J.L. The role of corporate communication in intelligent organizations. *J. Manag.* **2019**, *35*, 105–117. [\[CrossRef\]](#)
22. Banaszak, S. *Edukacja Menedżerska w Społeczeństwie Współczesnym Studium Teoretyczno-Empiryczne*; Wydawnictwo Naukowe UAM: Poznań, Poland, 2011.

23. Walters, D.; Wadsworth, E.J.; Davies, O.R.; Lloyd-Williams, H. Worker Representation and Consultation on Health and Safety An Analysis of the Findings of the European Survey of Enterprises on New and Emerging Risks (ESENER); European Risk Observatory Report; European Agency for Safety and Health at Work. 2012. Available online: <https://doi.org/10.2802/53799> (accessed on 7 April 2022). [CrossRef]
24. Andy, H. *New Technology, Work and Employment in the Era of COVID-19: Reflecting on Legacies of Research, New Technology, Work and Employment*; Brian Towers (BRITOW) and John Wiley & Sons Ltd.: Hoboken, NJ, USA, 2020; Volume 35, pp. 262–275. [CrossRef]
25. Tony, D. COVID-19 and the Past, Present and Future of Work, Future of Work. 2020. Available online: <https://futuresofwork.co.uk/2020/05/05/covid-19-and-the-past-present-and-future-of-work/> (accessed on 7 April 2022).
26. Pilipenko, Z. COVID-19 pandemic shock: Success of business in a human-centric socio-economic system. In *Adapting and Mitigating Environmental, Social, and Governance Risk in Business*; IGI Global: Hershey, PA, USA, 2021. [CrossRef]