# A Strategic Analysis of Selected Factors that Create the Culture of Occupational Health and Safety in Mining Companies in Poland, Part 1

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*Abstrakt*

*This article presents the results of a survey conducted among mining professionals. For a group of selected factors that create the OHS culture in mining companies, we carried out a strategic analysis. This could assist the executive personnel in decision-making to improve the level and quality of OHS culture in such companies. The first part of this publication is a SWOT analysis that covers selected areas of OHS culture, identified on the basis of our survey.*

*Keywords: organisational culture, mining industry, SWOT analysis, OHS*

**Introduction**

The mining business is one of the branches of industry with the highest work-related accident rates. On the basis of the conducted surveys, it can be concluded that there is room for improvement in work safety conditions across a number of identified areas. The key aspect is the broadly defined shaping of the OHS culture among the employees. On the basis of the conducted surveys, it can also be concluded that the employees are familiar with the vision and goals of their companies, and are satisfied with their work. In addition, most employees are able to identify workplace hazards and occupational risks. A clear cause for concern is the fact that around 30% of respondents report a deliberate disregard for the OHS rules both by employees and their immediate supervisors. A similar percentage of respondents clearly identify the issues related to the quality of training, and the prevention and reporting of near-misses.

Survey results show the level of organisational culture in companies. But to address the need for improving these relationships within organisations, and build the appropriate level of organisational culture, it is important to take into account their operating background. By taking advantage of opportunities and deploying prevention measures to avoid risks, mining companies can leverage favourable changes in the area of occupational health and safety.

Organisational culture is a corporate element which allows defining the company from a different perspective than the organisational perspective or one measured by economic values. This is such an extensive subject covering a broad range of aspects of corporate operations that it is difficult to clearly define this concept, especially within the mining industry. We have already discussed this topic in publications [2], [3], [9], [10], [11], [13], and [15]. Based on a tool that provides a vivid account of the importance of individual factors that create organisational culture, it is possible to strategically analyse each element. We have carried out relevant studies and published their results in [4] and [14].

On this basis, we created a web representation of OHS culture, which covers the following aspects:

- Company's vision and goals,
- Occupational risk assessment,
- Risk identification level,
- Management behaviour and safety control,
- OHS compliance and training,
- Accidents and near-misses.

However, in order to successfully manage each area, it is necessary to carefully analyse both its strong and weak points. What is also of some importance is to analyse opportunities and threats as part of a broader examination that goes beyond the micro-environment. For this purpose, we conducted a strategic analysis based on the SWOT analysis for each area. The analysis relied on our survey and individual interviews with mining professionals.

A SWOT analysis is a tool designed for internal and external business analysis to optimise corporate management or develop new strategic plans. The analysis can focus on an organisation, a project, an investment, or any business event. The primary goal of the analysis is to identify the current position of the examined organisation and its prospects, and, consequently, the optimum way to proceed [7], [8]. Its name is an acronym for the four parameters the technique examines [1] (Fig. 2):

- Strengths (strong points of the organisation, which, if used properly, will contribute to its growth, and now give the organisation an advantage over its competitors);
- Weaknesses (weak points of the organisation, which, if not eliminated or reduced, will hamper its growth; these can include insufficient qualifications, no division of responsibility, poor work organisation, or lack of other resources);
- Opportunities (the circumstances, which, if tapped into, might contribute to corporate growth);

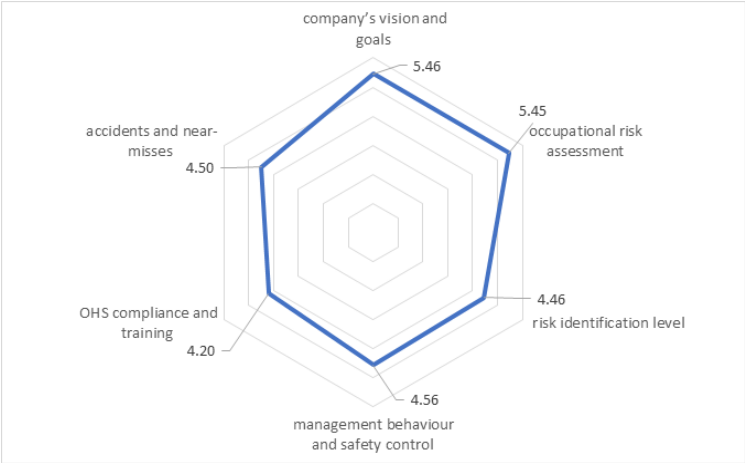


Fig. 1. A web representation of BHP culture, created on the basis of survey results. Source: [4]
Rys. 1. Internetowa reprezentacja kultury BHP, stworzona na podstawie wyników ankiety


Fig. 2. SWOT analysis. Source: Based on [17]
Rys. 2. Analiza SWOT

- Threats (factors that currently are not strong enough to bring the organisation down, but might affect its performance in the future).

As part of the analysis, we identified these four groups of factors, described how they impacted the future growth of an organisation and how they could be used to reinforce its strategy or drastically changed to improve the organisation's market position. SWOT analysis does not require that all factors be identified and described. It is sufficient that this be done for the key elements used for analysis. With the SWOT analysis one needs to think strategically, observe the changes taking place in the company's environment, and create reports and assessments, which are the basis for formulating possible scenarios for the organisation's growth [6], [18]. How accurate the analysis is largely depends on both the experience of the analyst and the detailed description of SWOT factors.

**Strategic analysis of occupational risk**

The purpose of occupational risk assessment is to ensure improved working conditions and protect the life and health of employees. The risk assessment itself involves the identification of risks and their seriousness, the assessment of risk levels, and the development of a plan to improve these working conditions. If these steps are completed successfully, work safety improves. Therefore, such actions should produce a level of certainty that the likelihood of an employee having an accident or developing an occupational disease is as low as possible.

Figures 3 and 4 show the strengths, weaknesses, opportunities and threats identified during occupational risk assessment in mining companies.

***Strengths:***

Every employer is required to assess the occupational risk for, and provide training to, each employee before they start to work [16]. Employees are required to work according to the information included in the relevant risk assessment sheet. Such information is communicated to employees during initial and periodic training. Estimated occupational risk is inspected by bodies such as the Chief Labour Inspectorate (PIP) and the Mining Authority (UG), responsible for supervising working conditions. Failure by an employee to observe the rules and prevention measures described in the assessment sheet constitutes a gross violation of safety regulations.

***Weaknesses:***

Working underground and workplace locations have been categorised as particularly dangerous. Lack of natural light, polluted air, a high level of mechanisation, risk of getting electrocuted, and uneven ground, are just examples of technical and organisational risks. Moreover, there are other risks, such as heart attack, noxious and explosive gases, fires, and rock bumps, that are often difficult to anticipate. Consequently, occupational risks are often comprise a set of several dozen anticipated risks, and if the method for risk reduction is ambiguous, this might pose a problem for employees. In-

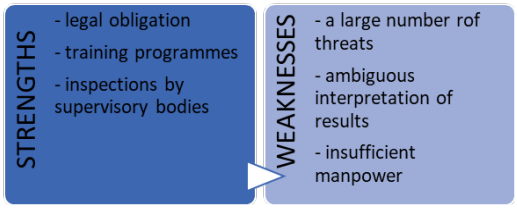


Fig. 3. Strengths and weaknesses related to occupational risk assessment in a mining company. Source: Authors
Rys. 3. Mocne i słabe strony związane z oceną ryzyka zawodowego w firmie górniczej

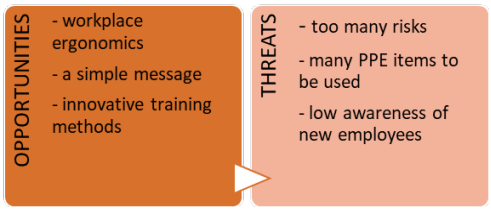


Fig. 4. Opportunities and threats related to occupational risk assessment in a mining company. Source: Authors
Rys. 4. Szanse i zagrożenia związane z oceną ryzyka zawodowego w firmie górniczej

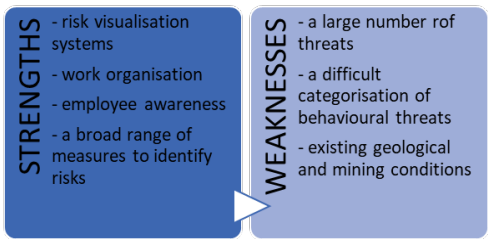


Fig. 5. Strengths and weaknesses related to risk identification in a mining company. Source: Authors
Rys. 5. Mocne i słabe strony związane z identyfikacją ryzyka w firmie górniczej

sufficient manpower and frequent turnover of employees also constitute weaknesses in terms of employee safety.

***Opportunities:***

By using advanced machinery, tools and personal protective equipment, business owners make work safer and more comfortable for their employees. A high level of automation and ergonomics reduce strains and limit the risk of accidents and occupational diseases. What is also important here is the role of the employer and support from employees in developing and managing workplace risk prevention measures. For these to be successful, employers need to continuously improve their management systems to encourage safe behaviour among their employees. A simple way to improve safety is to use innovative training methods, such as virtual reality technology.

***Threats:***

A significant problem for employees is the large number of risks listed on risk assessment sheets. In many cases, an identified risk calls for specific prevention measures and procedures. Faced with multiple risks, employees have to use many personal protective equipment items. This can be clearly difficult for new employees. And it is unacceptable for such employees to not undergo onboarding.

**A strategic analysis of the extent of risk identification**

Risk identification is intended to find dangerous, harmful and burdensome workplace factors that can cause accidents, occupational diseases or other damage, such as a failure or property loss. When risks are identified, the company should verify them to check if all risks have been identified. At this point, some risks are disregarded as having negligible effects on the company or its employees. The next step is to monitor the risks to check and assess whether no new risks are produced as a by-product of any of the corrective or remedial measures that have been designed.

The strengths, weaknesses, opportunities and threats associated with the identification of risks in mining companies are presented in Figures 5 and 6.

***Strengths:***

Mining companies have well developed risk visualisation systems that improve employee awareness and safety. Such companies often use information boards, warning signs, and multimedia presentations in common areas. With work organisation and automation, machinery and equipment are automatically shut down if the system detects any risk. For example, power is cut off if methane risk is identified. In addition, employees have personal equipment, such as multi-function gas analysers, with audio and visual warnings about workplace risks. Another strength is constant operational supervision through rapid information transmission via independent internal communication with the dispatcher.

***Weaknesses:***

An important problem for people working underground is the broad range of identified risks. This unique and unnatural

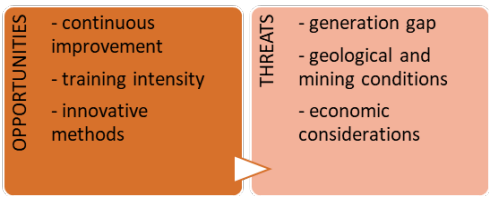


Fig. 6. Opportunities and threats related to risk identification in a mining company. Source: Authors
Rys. 6. Szanse i zagrożenia związane z identyfikacją ryzyka w przedsiębiorstwie górniczym

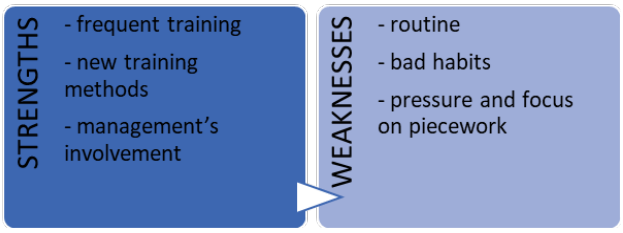


Fig. 7. Strengths and weaknesses related to training and OHS compliance in a mining company. Source: Authors
Rys. 7. Mocne i słabe strony związane ze szkoleniami i przestrzeganiem zasad BHP w firmie górniczej

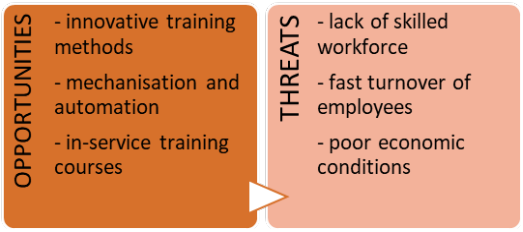


Fig. 5. Strengths and weaknesses related to risk identification in a mining company. Source: Authors

Rys. 5. Mocne i słabe strony związane z identyfikacją ryzyka w firmie górniczej

work environment makes it difficult to categorise behaviour-related risks. What makes this particularly difficult is the unpredictable behaviour of the rock mass. Although technology is constantly advancing and science and knowledge is developing, the natural environment still generates dangerous situations that are difficult to anticipate. What is also to blame for accident risks are the human element, or human error, and employee behaviour.

***Opportunities:***

What seems to be the natural course of action in terms of prevention measures is to increase the awareness of the consequences of the existing risks and to implement work safety management systems. An important element of such systems is the attitude of the company management, who should put emphasis of continuous improvement. Employee exposure to risks should be eliminated or limited through education. Therefore, there is a constant need for improving training programmes, and even the choice of their form can have an important effect on how effectively information is absorbed and retained.

***Threats:***

Employers have recently found it increasingly difficult to find skilled employees who are sufficiently qualified to meet their demanding and specific requirements. Continuous restructuring of this industry has produced a significant generation gap. So that now mining companies mostly employ older people with long experience. In addition, the deteriorating geological and mining conditions have contributed to increased workplace risks and a greater likelihood of accidents. In these circumstances, mining companies are generating high production costs, and economic considerations are the subject of the debate on the future functioning and development directions.

**Strategic analysis of training and OHS compliance**

Job training and OHS compliance are important parts of building a safety culture in an organisation [5]. Training programmes are required by law and OHS management system requirements. All employees in an organisation must be competent to perform their individual roles. Accordingly, their certified qualifications need to be on a par with the demands imposed on them by the company [12].

Having at their disposal modern training methods where information can be presented using multimedia presentations, instructional materials, animations, computer simulations, etc., companies can raise the awareness of their employees. Consequently, by analysing external factors that could affect learning retention and OHS compliance, companies can identify a number of factors that can, to a smaller or greater degree, create the quality of their organisational culture. The most important of these are presented in Figures 7 and 8.

***Strengths:***

Companies are required to provide frequent refresher training. People in worker positions must undergo training

at least once a year. Moreover, onboarding programmes are being implemented to have instructors or supervisors oversee the work and attitudes of new employees to foster safe behaviour. Information is also communicated through multimedia in common areas, such as waiting rooms or shaft tops, and the Internet, on websites and online platforms. New training methods are preferred especially by the managers who show strong commitment to their work.

***Weaknesses:***

In mining companies, there are predominantly employees with long work experience, often more than 20 years, who can retire when they reach 25 years on the job. The psycho-social risks associated with working underground include routine and bad habits. This is connected with the long experience of such employees, as a result of which they tend to ignore occupational risks. Moreover, there is still significant financial pressure, which is related directly to piecework.

***Opportunities:***

Mining companies have been creating R&D institutes and collaborating with scientists to implement innovative training methods. In addition to these efforts, advanced software and virtual reality (VR) equipment are being developed to simulate potential risks and help work on the procedures and skills to handle real-life threats. And with the mechanisation and automation of the production process, the need for employees to be physically present can be limited or completely eliminated to minimise the risk of accidents. By doing in-service training or postgraduate courses, employees can acquire new skills and qualifications to support the culture of safety at work in their companies.

***Threats:***

The greatest safety risk is the regularly decreasing number of skilled workforce. As a result of insufficient manpower, there is a fast turnover of employees to meet production demands. In addition, safety prevention is closely related to the economic situation of the company, whose performance depends on economic conditions and resource prices.

**Conclusion**

This strategic analysis of selected factors that create the culture of occupational health and safety in mining companies was based on a SWOT analysis. With this approach, we were able to explore both the strengths that support the culture existing in the company, and to identify the opportunities that could be seized by the management to improve the quality of this culture across specific business areas. On the other hand, we analysed the weaknesses that significantly undermine the quality of OHS culture. And the threats we identified can be addressed in advance to prevent them from having any adverse consequences. With all these diagnosed, mining companies can effectively and successfully manage their occupational health and safety culture.

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## *Analiza strategiczna wybranych czynników kształtujących kulturę bezpieczeństwa i higieny pracy w przedsiębiorstwach górniczych w Polsce, część 1*

*W artykule przedstawiono wyniki ankiety przeprowadzonej wśród górników. Dla grupy wybranych czynników tworzących kulturę BHP w firmach wydobywczych przeprowadzono analizę strategiczną. Może to pomóc personelowi wykonawczemu w podejmowaniu decyzji w celu poprawy poziomu i jakości kultury BHP w takich firmach. Pierwsza część niniejszej publikacji to analiza SWOT, która obejmuje wybrane obszary kultury BHP, zidentyfikowane na podstawie badania ankietowego.*

*Słowa kluczowe: kultura organizacyjna, przemysł wydobywczy, analiza SWOT, BHP*