



Enhancing Workplace Safety: A Comprehensive Action Plan for Duong Huy Coal Company (2021–2025)

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Abstract

Workplace safety is of paramount importance in industries such as coal mining, where accidents and occupational illnesses can result in significant human and economic costs. This study aims to develop an action plan to improve safety standards at Duong Huy Coal Company from 2021 to 2025. A comprehensive survey involving 93 safety managers and 379 workers from various production sites was researched to gather insights and opinions on safety priorities. Focus group discussions and expert consultations were employed to assess the current safety situation, identify challenges, and develop coherent safety solutions. Based on the survey results, the proposed action plan focuses on the following objectives: reducing workplace accidents by 20-25% annually, progressing towards zero accidents in the following years, and increasing productivity and benefits for both workers and the company. The plan also emphasizes the role of company leadership in widely communicating their commitment to safety and the need for individual units within the company to proactively plan, budget, and implement safety measures following their functions and responsibilities. Collaboration with relevant state agencies, mass mobilization campaigns, and the application of science and technology in safety and occupational health will further contribute to the enhancement of workplace safety at Duong Huy Coal Company.

Keywords: workplace safety, safety standards, safety solutions, extractive industries, Duong Huy coal company

1. Introduction

The field of mining is always evaluated as having a high risk of occupational safety hazards, with numerous accidents and occupational diseases occurring each year (Jiskani et al., 2020; Lu et al., 2020; Nguyen et al., 2021; Tetzlaff et al., 2021). This situation persists and demands special attention from regulatory authorities and businesses operating in the industry (Burke & Signal, 2010; Dodoo et al., 2023; He & Song, 2012; Lewis-Beck & Alford, 1980). In this context, Duong Huy Coal Company (DHC), a underground technology-based mining enterprise under the Vietnam National Coal and Mineral Industries Holding Corporation Limited (Vinacomin), has implemented various measures to improve production safety. However, many issues remain unresolved. A comprehensive and tailored action plan to enhance production safety at DHC is still lacking. DHC aims to produce 2.2 to 2.5 million tons of coal annually in the forthcoming years. Among nearly 3,000 employees, many miners are minority ethnic people. Their understanding and awareness of safety is of significance to the company. To meet the sustainable development goals for 2030 and reduce the occurrences of occupational accidents and diseases, the company needs to propose effective and coordinated solutions within an action plan (Bahn, 2013; Hine et al., 1999; Jiskani et al., 2020; Lu et al., 2020; McAfee & Winn, 1989).

Enhancing production safety will safeguard the lives and health of the workforce and help the coal mining industry, particularly DHC, achieve its objectives of clean and safe mines (Beus et al., 2016; Opoku et al., 2020; Rivas et al., 2011). This research aimed at reducing occupational accidents in the min-

ing sector and improving the quality of life for workers and the surrounding community.

This study builds upon the knowledge and experiences from previous research on occupational safety in the mining sector (Colligan & Cohen, 2009). The insights gained will be utilized to identify and propose reliable and efficient solutions to enhance production safety at DHC.

The proposed action plan will offer a timeframe and specific measures to enhance production safety, enabling effective risk management and reducing occupational accidents. The research outcomes will support DHC and other mining enterprises in developing appropriate action plans to ensure safety and sustainable development.

The paper is divided into several main sections, including research methodology, followed by the results of our survey. We conclude by discussing the implications, limitations, and future research directions of our work.

2. Research methodology

2.1. Measures and questionnaire development

Through qualitative research, the research team has identified five influencing factors on the safety culture at DHC: factors related to legal and policy issues; technical and technological aspects; organizational and management work; workers' consciousness; and leadership.

All the measurement scales have been inherited from previous studies and adjusted as necessary based on the suggestions from qualitative research results. The scales all use a 5-point Likert scale, where 1 represents 'completely disagree' and 5 represents 'completely agree'.

2.2. Sample and data collection

The research team conducted a survey involving 93 safety managers and 379 workers at various construction sites and workshops. The majority of the participating workers had considerable experience, with a work tenure of 10 years or more at the Company. Given their extensive experience and long-standing commitment to the Company, the responses to their survey questionnaires ensure high quality and reliability, providing a fundamentally accurate reflection and relatively precise assessment of the current safety conditions at DHC.

After the analysis, the results were discussed in focused group sessions, involving occupational safety experts and the management team of the company. This collaborative effort aimed to interpret the findings and identify possible solutions.

3. Results

Majority of workers (76.25% of those surveyed) feel anxious and stressed about occupational accidents (both past incidents and potential ones). Additionally, most workers (70.71% of those surveyed) believe that occupational accidents have an impact on their mental well-being.

Regarding the assessment of future trends in occupational accidents, the majority of surveyed workers expressed optimistic views, indicating that the incidence of occupational accidents at the company is expected to decrease. This demonstrates their confidence and commitment to the goal of reducing occupational accidents at the company.

According to workers' evaluations, there are several major risk factors for occupational accidents at the company, including risks from production, transportation, electrical hazards, toxic substances, unsafe equipment, organizational aspects, workers' skills, and workers' consciousness. Some significant factors contributing to occupational accidents include:

- Risks related to transportation operations.
- Risks associated with workers' skills.

These risks are considered significant due to various reasons:

- Increasingly deep mining operations create difficulties for production activities in general and transportation operations in particular. Additionally, the complex geological conditions pose challenges in mechanizing transportation activities and may result in potential occupational accidents.
- The growing complexity of mining operations, coupled with labor shortages and difficulties in labor recruitment, leads to limitations in providing comprehensive technical training to workers in mining enterprises, including the Company (limitations in training time, quality of trainees, etc.).

Workers acknowledge significant risks from toxic substances, dust, electrical hazards, and unsafe equipment as they are directly involved in production, making their perceptions and evaluations more accurate. Some high-level risks arise from transportation operations, toxic substances, and workers' skills that are not ensured.

Moreover, there are substantial risks related to workers' consciousness:

- Risks of compromising food safety and hygiene;
- Risks associated with inclement weather and adverse

climates;

- Risks arising from workers' subjective behaviors;
- Hazards within furnaces, such as falling rocks, collapsing roofs, etc.;
- Risks resulting from reckless driving of vehicles (unsafe driving);
- Lapses in centralized control, lack of observation, and improper operation of equipment;
- Tripping or stumbling in workplaces, both inside and outside the mines (uneven, muddy terrain);
- Landslides and slippery conditions;
- Malfunctioning hydraulic columns.

DHC needs to identify and analyze these specific risks to implement measures aimed at reducing the risks to occupational health and safety.

One core factor contributing to these issues is the lack of self-discipline and awareness of labor safety among a significant number of personnel and workers within the Company. Alongside improvements in working conditions, some potential safety risks remain due to limitations in mining technologies, mining exploitation practices (XDY self-moving hydraulic beam), transportation technologies, rail transport, hoists, ramps, and the lack of synchronization in equipment standards. Issues related to mine drainage and ventilation also need further attention.

Moreover, technical management and occupational safety and environmental management still have significant limitations. The subjective organizational practices of workshop commanding officers and the consciousness of some workers contribute to numerous safety violations. The experience and capability of personnel are insufficient, and production organization remains less scientific. Supervision and construction management are not thorough and practical, and the dissemination of information has not been sufficiently deep to raise the self-discipline and safety consciousness of many personnel and workers, leading to numerous persisting problems.

From the perspective of a language translation expert, here's the translation of the paragraph into native English:

- The action solutions approach the perspective of the world: starting with technical solutions, then proposing organizational solutions, and finally focusing on solutions related to human factors.
- The solutions comply with and implement the national standards and regulations, and of the Vinacomín.

The implementation roadmap and organizational measures are depicted in the diagram as shown in Table 1.

4. Discussion and conclusion

The workforce is considered the most valuable 'asset' of any enterprise and plays a crucial role in constructing a safe working environment.

As a result, the topic proposes action programs focused on solutions to enhance production safety with the goal of reducing occupational accidents by 20-25% annually, while increasing productivity and benefits for both workers and the businesses.

The approach of the proposed solutions originates from technical measures, followed by organizational proposals, and ultimately concentrates on human-related measures, compli-

1 st Period	2 nd Period	3 rd Period	4 th Period
Establishing a general vision for safety work in the company: <ul style="list-style-type: none"> • Reduce the number of severe occupational accidents by 15% per year compared to 2020, reaching a reduction of 25% by 2023 compared to 2020. • Increasing productivity and benefits for both workers and the company. • (Combining the goal of increasing income for workers). 			
Implementing technical solutions: <ul style="list-style-type: none"> • Conducting research on selecting alternatives to the XDY self-moving hydraulic beam for 4 furnaces using the inclined cross-cutting technology with ZRY type flexible retaining supports. Implementing organizational management solutions. <ul style="list-style-type: none"> • Establishing rules for safe labor practices. 			
Implementing organizational and labor management solutions (continuously implemented until the end of 2025) <ul style="list-style-type: none"> • Forming a Learning Organization in DHC. • Arranging workplaces rationally. • Workers create safety plans for each month, quarter, and year. • Regularly maintaining workplace cleanliness. • Workers keep safety logs updated. • Early detection of safety hazards. 			
Investing in safety warning equipment.			
Reviewing the terms in contracts with contractors and adding clauses related to occupational safety and hygiene.			
Reviewing and updating safety regulations and policies <ul style="list-style-type: none"> • Encouraging and motivating the labor force. • Providing rewards and bonuses. • Implementing disciplinary actions. Developing regulations and policies for instructors cum officials. Designing handbooks for workers on work procedures and first aid methods for accidents. 			
Designing a handbook for workers providing instructions on work procedures and first aid methods for accident victims.			
	Establishing safety teams at various construction sites and workshops.		
Communication solutions (continuously implemented during the period until the end of 2025) <ul style="list-style-type: none"> • Management officials establish a positive image, setting examples for colleagues and workers in ensuring occupational safety and hygiene. • Management officials strengthen discussions with colleagues and workers on occupational safety and hygiene to exchange experiences, provide guidance, and understand the suggestions and innovations of workers. • Promoting and disseminating safety culture through various flexible and continuously updated means. • Changing posters, banners, and slogans related to safety every 6 months to increase the workers' attention and maintain effectiveness. • Establishing exemplary models for occupational safety among minority ethnic workers. 			
		Implementing the safety plan for each individual worker	
		Building a template system to collect, update, and serve risk analysis	
Setting role models of safety at various levels: leaders, workers, teams, especially among workers from minority ethnic groups (continuously throughout the period until the end of 2025).			
	Interlinking safety and income	Interlinking safety and income	Interlinking safety and income
Safety implementation evaluation and assessment:			

ance, and implementation of state regulations and those of the Vinacomin.

The solutions provided by the authors include:

- Technical measures involving technology and safe technical procedures.
- Organizational solutions for production, encompassing measures related to production operations, equipment, and processes.
- Management solutions, encompassing policies, educational campaigns, safety training, and a reward and disciplinary system for safety compliance.
- Worker-related solutions, comprising proposals for leadership teams at department and workshop levels,

as well as solutions for workers themselves.

- The topic also outlines the timeline and measures to implement these groups of solutions.

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