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Evaluation of the Implementation of Mining Safety Management Systems in Mining Services Companies in Copper and Gold Mines (PT X)

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ARTICLEINFO ABSTRACT

Keywords: Mining Safety Management System, Occupational Safety and Health, Operational Safety.

This research aims to evaluate the implementation of the Mining Safety Management System at PT X. This research was conducted at PT X in 2023. The general stages of the research start from literature study/Literature review then observation and data collection. Data collection is carried out through interviews, field observations and document reviews. The implementation of the Mining Safety Management System at PT X already implemented Mining Safety Management Systemin accordance with applicable regulations, demonstrate positive achievements although there are still several areas that need improvement. Judging from the assessment of each element that has not been fulfilled optimally. PT X needs to focus on increasing worker participation, more intensive risk monitoring, meeting competency standards, and consistency in implementation and evaluation Mining Safety Management System. In addition, improvements to document control, communication of management review results, and internal audit follow-up are also important steps to improveimplementation of a Mining Safety Management System so that it can run effectively and efficiently in ensuring mining safety at work sites

INTRODUCTION

The mining industry is one of the vital sectors in the global economy that shows a high potential for danger. The special characteristics of this sector involve large capital, high technology, the use of special equipment and high risks that continue to grow over time (Setianingrum & Susilowati, 2020). With high risk activity conditions, a management system is needed that guarantees safety in mining activities, namely the Mineral and Coal Mining Safety Management System. The Mining Safety Management System is part of the management system for holders of Mining Business Permits (IUP), Special Mining Business Permits (IUPK), People's Mining Permits (IPR) and Mining Services Business Permits (IUJP) as a whole in the context of controlling mining safety risks which consists of Mining Occupational Safety and Health and Mining Operation Safety (Awang, Baharudin, & Saliluddin, 2019). Mining Occupational Health and Safety Mining operations are very important for the company's success in achieving effective and efficient production. To create a work environment that is safe and free from threats, a Mining Safety Management System must be implemented. This is because unsafe conditions and actions in mining activities can cause equipment damage, injury, or even death, which of course can hamper production.

In managing and controlling the dangers and risks of Mining Occupational Health and Safety and Mining Operation Safety, the company must be committed to implementing and implementing the Mining Safety Management System. The Mining Safety Management System throughout the company environment and work unit areas. Every party must be involved in implementing and implementing the Mining Safety Management System starting from the highest management level to implementers in the field (Wardani & Khamim, 2021). The Mining Safety Management System serves as a reference for company mine And mining services in Indonesia in running Mining Safety Management System, even though it had previously implemented an Occupational Safety and Health Management System (SMK3).

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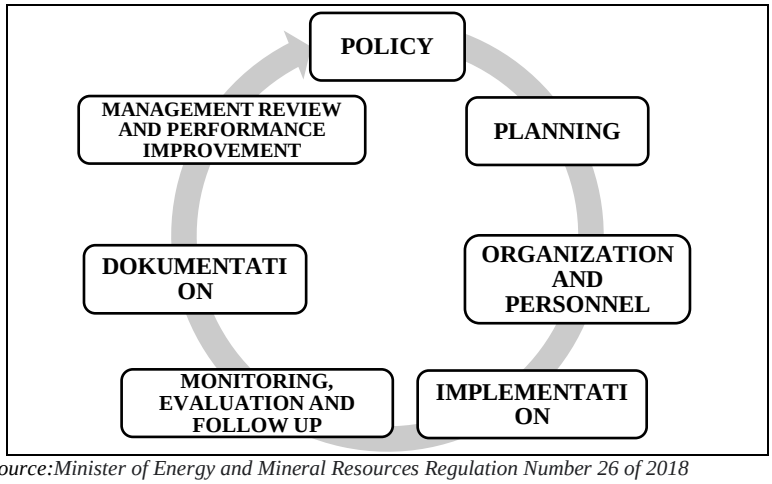
According to Elgstrand et al. (2017) safety management systems in mining areas are an industry that is strictly regulated because of the many dangers inherent in operations and work. The implementation of safety management systems in South Korea, Australia and several countries in Europe for companies is carried out voluntarily (Wardani & Khamim, 2021). In Indonesia, Mining Safety Management System must be implemented by companies operating in the mining sector and mining service companies as a statutory requirement for these companies. This refers to Regulation of the Minister of Energy and Mineral Resources Number 26 of 2018, Decree of the Minister of Energy and Mineral Resources Number 1827 K/30/MEM/2018 and Decree of the Director of Minerals and Coal Number 185.K/37.04/DJB/2019.

In Ministerial regulations Mineral Resources Energy Number 26 of 2018 definition of Mining Safety Management System is part of the Company's overall management system in the context of controlling mining safety risks which consists of Mining Occupational Safety and Health and Mining Operations Safety. The objectives of the Mining Safety Management System are as follows:

1. Increase effectiveness first safety a planned, measurable, structured and integrated Mining Safety Management System.
2. Prevent accident mines, disease consequence dangerous work and events.
3. Create activity operational mine Which safe, efficient and productive
4. Create place safe, healthy, comfortable work and efficient to increase productivity.

In its application, there are 7 (seven) elementsMining Safety Management System, namely Policy, Planning, Organization and personnel, Implementation, Evaluation and follow-up, Documentation and Management review and work improvement (Figure 1).



Source:Minister of Energy and Mineral Resources Regulation Number 26 of 2018

Figure 1. Mineral and Coal SMKP Elements

PT X is alliance partner businesses that provide service mining that is mining open, drilling and blasting, planning mines, as well reclamation for company mine copper and gold located in West Nusa Tenggara. PT X is mandatory for apply System Management Safety Mining in the work area and integrate with existing systems. Implementation of a Mining Safety Management System requires a mature and structured strategy to ensure worker safety and sustainable mining operations. develop and communicate a strong safety policy that defines the company's commitment to worker safety (Githasari, 2018).

PT X obey regulation legislation with implement and conduct internal audits of System Management Safety Mining in accordance with regulation current regulation. In this context, this research aims to evaluate the implementation of the Mining Safety Management System at PT X in 2023. This research will provide deeper insight into the extent of implementation at PT X to improve work safety (Stemn et.al. 2019). This evaluation is the basis for identifying areas that still need improvement, both in terms of policy, planning, organization and implementation of the Mining Safety Management System at every level of the company. By carrying out continuous evaluations, PT X can direct the Mining Safety Management System and its efforts towards achieving the goal of zero accidents. This effort is not only about fulfilling regulations, but is also an investment in maintaining safety and health in the mining work environment, so that it can have a positive impact on workers, companies and the surrounding community.

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RESEARCH METHODS

This research was conducted at PT X in 2023. The general stages of the research start from literature study/Literature review then observation and data collection. Data collection is carried out through interviews, field observations and document reviews. This data collection aims to obtain a comprehensive understanding of the implementation of the Mining Safety Management System at PT X. The data is then processed or analyzed to obtain research results. Data analysis to assess the implementation of the SMKP Minerba used in this study is using the audit method. The audit assessment is carried out based on the elements and sub-elements of the Mineral and Coal SMKP based on the audit criteria for assessing the implementation of the SMKP listed in the Decree of the Director General of Mineral and Coal Number 185.K/37.04/DJB/2019 concerning Technical Instructions for the Implementation of Mining Safety and the Implementation, Assessment, and Reporting of the SMKP Minerba. The results of this study will answer the problems studied so that conclusions can be drawn. Conclusions are drawn up based on the results and discussions that refer to the research objectives. The stages of the research carried out can be seen in Figure 2.

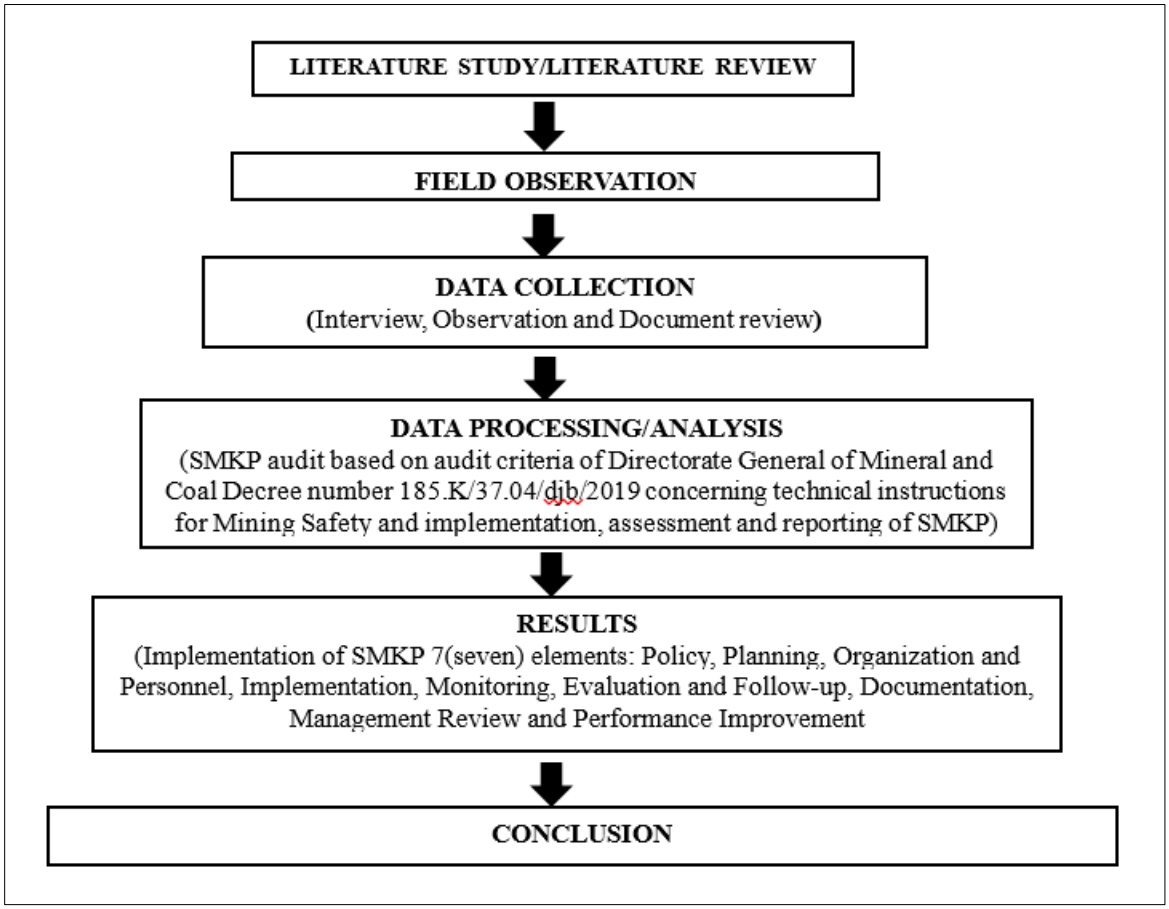

Figure 2. Research Stages

RESULTS DAN DISCUSSIONS

Based on the audit result data, the achievement percentage of Mining Safety Management System implementation at PT X is 8.42%, Planning element is 9.83%, Organization and personnel elements are 12.84%, Implementation elements are 25.79%, Monitoring, Evaluation and Follow-up elements are 10.23%, Documentation elements are 2.0% and Management Review and Performance Improvement elements are 3.08%. Achievement of System implementation Management Safety Overall mining was 72.19% (Table 1).

Table 1. Implementation Mining Safety Management System at PT X

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No.	Element	Percentage of Maximum Element Value (%)	Percentage of Achievement Value
1.	Policy	10 %	8.42 %
2.	Planning	15 %	9.83 %
3.	Organization and Personnel	17 %	12.84 %
4.	Implementation	35 %	25.79 %
5.	Monitoring, Evaluation and Follow-up	15 %	10.23 %
6.	Documentation	3 %	2.0 %
7.	Management Review and Performance Improvement	5 %	3.08%
Total Implementation of Mineral and Coal SMKP		**100%**	**72.19 %**

Source:Research Data Processing

The following is an evaluation of the implementation of the 7 (seven) elements of the Mining Safety Management System at PT X:

1. Policy

The results of the analysis of the implementation of policy elements in PT X are 8.42% of the maximum percentage of 10%. This shows that the company has considered the initial review of mining safety provisions such as mining safety risk reviews and assessments of the efficiency and effectiveness of the resources provided, but has not considered the comparison of mining safety implementation with IUP, IUPK, IUP Production Operation holders specifically for processing and/or refining IPR or other IUJP and/or other better sectors. In addition, the company has not involved workers and/or paid attention to input from labor unions. Currently, there is a vision, mission, and objectives regarding mining safety aspects and compliance with statutory provisions in the field of mining safety and other requirements and there is evidence of commitment to implementing mining safety including prevention of occupational diseases and incidents of occupational diseases, prevention of dangerous incidents and efforts to prevent damage to assets and cessation of production. The Company has established a mining safety policy, environmental impact, and social impact in writing, dated and signed by top management, which is dynamic in nature by adapting to changes that occur in the company. The Company has communicated the mining safety policy and in implementing the communication of the policy has used several media in delivering the policy communication such as bulletin boards, verbally in daily meetings, weekly meetings and/or other media in each department. The Company has conducted periodic reviews of the Mining Safety, Environment and Social Impact Policy by considering internal and external changes (such as statutory provisions) and applicable standards.

2. Planning

The results of the analysis of the implementation of planning elements in PT X are 9.83% of the maximum percentage of 15% (Table 1). This shows that the implementation of SMKP in the planning element has not been fully fulfilled. The company has conducted initial studies such as systematic business processes and business interactions, adjustments to legal regulations and standards, and has determined the level of achievement of mining safety performance. The company has conducted consultations and communications, but only with some stakeholders, has not identified internal and external factors in their entirety, because only some external factors (compliance with laws/regulations) and has not identified all sources, actions, and conditions that can cause danger, has not conducted risk communication and consultation. The company has conducted risk assessments or risk controls, but not all hazards have been identified. The company has conducted monitoring and risk assessments, but it is still found that in some areas it has not conducted monitoring and risk assessments in the event of an accident. The company has identified laws and regulations and other requirements, but has not evaluated the fulfillment of laws and regulations and other requirements where related to employee Medical Check Up (MCU) still uses laws and regulations that are no longer applicable, namely the Decree of the Minister of Mining and Energy Number 555.K/M.PE/1995 concerning General Mining K3. The company has set targets, targets, and programs that have been approved by the Mining Safety Committee. All targets, targets, and programs that have been set are in line with policies and have been measured and the preparation of the program has fully considered all provisions for preparation. The company has a Mining Safety Work Plan and Budget (RKAB). The preparation of the Mining Safety RKAB has not considered the priority scale of mining safety targets and programs, the need for continuous improvement and enhancement of mining safety and compliance with laws and regulations and other related requirements and has not been in accordance with the approval of the Head of Mining Engineering (KTT).

3. Organization and Personnel

The results of the analysis of the implementation of the Organization and Personnel elements at PT X are 12.84%

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of the maximum percentage of 17% (Table 1). This explains that the company has an organizational structure that describes the positions of Operational Responsible Person (PJO), operational supervisor, technical supervisor and mining safety manager in accordance with the required provisions and has been communicated to workers and related parties. PJO has formed and determined the KO section. KTT has appointed all operational supervisors in the field with a Letter of Appointment of Operational Supervisor and Technical Supervisor, but the operational supervisor still does not have an Operational Supervisor Card authorized by KaIT. KTT has appointed competent mining technical personnel, but not all mining technical personnel have certification according to the applicable work competency standards, but this has not been stated in the letter of appointment of technical personnel. The structure of the company's Mining Safety Committee in 2023 has been determined but all members have not received the required education and training. The company has prepared a personnel selection and placement system by considering the results of work competency identification, including mining safety aspects in it, each personnel has clear duties and responsibilities (covering mining safety aspects) and all personnel interviewed understand and carry out their responsibilities. The company has identified mining safety work competency standards, but not all workers have competencies that are in accordance with national standards. The company has prepared, implemented and documented procedures for participation, consultation, motivation and awareness of the implementation of SMKP Minerba or SMKP specifically for Processing and/or Refining, and has involved all departments/worker sections and other related parties in the implementation and development of SMKP Minerba from participation, consultation, motivation and awareness with all workers and other related parties as input in improving the implementation of mining safety.

4. Implementation

The results of the analysis of the implementation of the Implementation element in PT X are 25.79% of the maximum percentage of 35% (Table 1). This shows that the implementation of SMKP in the implementation element of PT X has not been fully fulfilled. The company has prepared and established documented work operating procedures with the provisions that the procedure has been approved by the KTT based on the existing document level and has been given a document number, the preparation of the procedure has taken into account the results of behavior-based safety mapping for the Standard Task Guidelines (PTB), the procedure has been evaluated and reviewed periodically in the event of an accident, equipment changes, process changes and/or material changes, has been implemented consistently by all workers in carrying out their work, but the procedure has only been communicated to a few related parties. The company has a procedure for special work permits. Special work permits have been evaluated periodically and special work permits have been implemented consistently by all workers (no violations related to special work permits were found in all areas). The company has conducted an assessment of the need for Personal Protective Equipment (PPE)/work safety equipment in accordance with the type of work and the hazards that arise, provided sufficient PPE/work safety equipment free of charge, has conducted training for workers regarding the function, benefits and use and maintenance of PPE/work safety equipment and has carried out an evaluation of compliance with the use and maintenance of PPE/work safety equipment, however based on the results of the September 2023 monthly hazard report review, it was found that not all workers were compliant in using PPE/work safety equipment (safety glasses and gloves) because it was the top 5 hazard reports in the maintenance area.

The company has managed dust, noise, vibration, lighting hazards, quantity and quality of work, work climate management, chemical management, biological management by carrying out regular documented measurements and assessments (evaluations), which have been carried out by competent mining technical personnel using tools. examinations that have been proven to have been calibrated and maintained according to procedures and risk control related to dust but the measurement results have not been followed up and are still in the process of laboratory analysis, but from the results of measurements of dust, noise, vibration, lighting hazards, quantity and quality of work, work climate management, chemical management, Biological management has not yet been followed up because there are no recommendations from the results. The company has managed radiation hazards in accordance with applicable requirements. The company has carried out environmental cleanliness management in accordance with applicable requirements. The company has been proven to provide occupational health services in accordance with requirements, has implemented first aid management by establishing procedures, held first aid training but the provision of officers is still inadequate (not enough) in several areas and the management of first aid kits is not in accordance with the provisions of statutory regulations. The company has been proven to manage worker fatigue in accordance with the requirements. The company has been proven to manage workers who work in places with high health risks in accordance with the requirements. The company has managed occupational health data records, by establishing procedures, maintaining and guarding occupational health data records, analyzing and evaluating occupational health data records but has not created occupational health performance

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statistics using 2 (two) indicators, namely process indicators (leading indicators) and only use indicators of final results (lagging indicators). The company has been proven to carry out hygiene and sanitation management in accordance with the requirements, it was found that there were no results of identifying ergonomic hazards and ergonomic measurements for work that was repeated over a long period of time, such as activities in the office.

The company has established procedures for managing Mining Installation Infrastructure and Equipment (SPIP), created a SPIP list, maintenance maintenance has been carried out in accordance with the program, schedule and procedures and mining equipment has been carried out by competent mining technical personnel. The company has established installation safety procedures, made a list of installations and installation safety requirements, installation safety maintenance has been carried out in accordance with programs, schedules and procedures and is carried out by competent mining technical personnel. The company has feasibility testing and SPIP testing procedures in the Maintenance department. Implementation of feasibility testing and maintenance of mining infrastructure and equipment is carried out by mining technical personnel who are competent in the field of KO in accordance with the provisions of statutory regulations. There is evidence that the KTT has appointed mining technical personnel who are competent to prepare and establish procedures, create programs and schedules, but welding technical personnel have not yet been appointed because they only have competency certification based on the results of a review of the technical personnel appointment letter documents. The company conducted a technical study, but the technical study of the safe blasting distance for mining equipment and facilities of 300 (three hundred) meters, was approved by the KTT and has not been approved by KaIT.

The company has established documented "Design and engineering" procedures by considering mining safety aspects in the design and engineering stage, establishing procedures governing changes and modifications to design and engineering that have mining safety risks and/or have implications for statutory provisions, identified , documented, reviewed and approved by authorized persons, which includes officers who have the competence to carry out identification and review. The company has implemented documented procedures regarding the requirements, selection and determination of mining service companies to ensure that each mining service company fulfills mining safety requirements as required, has established documented procedures regarding the evaluation of mining service companies in accordance with established requirements, established documented procedures regarding the evaluation of mining service companies and providing feedback on the results of the evaluation. The Company has established a documented procedure regarding the management of emergencies "Emergency Management Procedure" and includes identification and assessment of potential emergencies, emergency prevention, emergency preparedness, emergency response and emergency recovery, however these procedures have not been implemented properly. The company has implemented first aid management by establishing procedures, however there are first aid boxes whose contents do not comply with statutory provisions or have expired. The company has carried out and communicated safety outside of work to all workers and their families with promotional materials and safety activities outside of work have been documented.

5. Monitoring, Evaluation and Follow-up

The results of the analysis of the implementation of the Monitoring, Evaluation and Follow-up elements in PT X are 10.23% of the maximum percentage of 15% (Table 1). This shows that the company has conducted monitoring and measurement of the achievement of mining safety targets, targets, and programs that have implicitly explained the appropriate methods, frequencies, scopes, and equipment and in its implementation has conducted evaluations related to the K3 targets, targets, and programs. The company has procedures for monitoring, measuring performance, evaluating, and following up on work environment management that explain the appropriate methods, frequencies, scopes, and equipment, where monitoring and measurement have been carried out in accordance with the procedures and have conducted monitoring and measurement of work environment management performance by hygiene officers as stipulated in the procedure, but have not yet determined a follow-up and improvement plan based on the evaluation results because the measurement results are still in the laboratory analysis process. The company has procedures for monitoring, measuring performance, evaluating, and following up on work environment management that explain the methods, frequency, scope, and appropriate equipment, where monitoring and measurement have been carried out in accordance with the procedures and have carried out monitoring and measuring of work environment management performance by hygiene officers as stipulated in the procedures, but have not yet determined a follow-up and improvement plan based on the evaluation results because the measurement results are still in the laboratory analysis process. The company has carried out monitoring and measuring of KO performance and carried out by competent mining technical personnel regarding monitoring, measuring performance, evaluating and following up on explosives and blasting management that explain the methods, frequency, scope and appropriate equipment, and evaluation of explosives and blasting material management, has determined a follow-up and improvement plan based on the evaluation results. The company has

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a mining safety inspection procedure, carried out in accordance with the procedure, the inspection results are documented and an improvement plan is made, but some of the improvement plans are implemented late. The company has a procedure to evaluate compliance with laws and regulations and other requirements, but only some of the follow-up plans for the results of the compliance evaluation have been implemented in 2023. The company has a procedure for investigating accidents, dangerous incidents, incidents due to occupational diseases and occupational diseases, has been implemented. according to procedures and improvement plans have been made, but some of the improvement actions have not been implemented. The company has conducted an evaluation of documents and reports on the fulfillment of competencies in accordance with statutory provisions and other requirements, but the evaluation carried out is inadequate because not all departments have received reports on the fulfillment of competencies. The company has conducted an internal audit of the Mining Safety Management System in accordance with procedures, but some audit results have not been followed up. The company has a "Corrective and Preventive Action" procedure, but the procedure is inadequate and does not explain the analysis of the causes of non-conformities, actual evaluation of the follow-up plan is carried out periodically (weekly and monthly).

6. **Documentation**

The results of the analysis of the implementation of Documentation elements in PT X are 2 % of the maximum percentage of 3% (Table 1). This shows that the company has prepared, established and documented the Mining Safety Management System manual that has been approved by the Summit and the Mining Safety Management System manual has been socialized to all departments in the Ministry of Manpower, but has not been used consistently in preparing the next level of documents. The company has established and documented the document control procedure "Document Control Procedure", but document control has not been implemented consistently. The company has established a mining safety record-keeping control procedure, but the record-keeping control procedure has not been implemented consistently. The company has determined the types of documents and document control but has not covered all elements of the Mining Safety Management System.

7. **Management Review and Performance Improvement**

The results of the analysis of the implementation of management review elements and performance improvement in PT X are 3.08% of the maximum percentage of 3% (Table 1). This shows that the Company has carried out periodic management reviews of the implementation of the Mining Safety Management System, but this has not been done by the company's highest leadership (President Director). The Company has documented records of the results of the management review based on document reviews and has not covered all the discussion topics (input) as required by the audit results regarding the implementation of the Mining Safety Management System, communications related to related external parties, including complaints, the level of achievement of mining safety performance, changes that have occurred, including laws and regulations and the structure of the mining safety organization. There is evidence that the output of the mining safety management review has resulted in decisions related to improving mining safety performance that have comprehensively considered the elements of the Mining Safety Management System. There is evidence that the company has recorded, documented, reported and communicated the results of the management review to interested parties, but has not been communicated to the parties in need. The Company has been proven to have implemented performance improvements. The Company has used some of the results of the follow-up improvement review as a basis for determining policies regarding the process of improving mining safety performance.

The achievement of the implementation of SMKP Minerba in PT X on 7 (seven) elements based on the provisions of the legislation in the Decree of the Director General of Mineral and Coal Number 185.K / 37.04 / DJB / 2019 concerning Technical Instructions for the Implementation of Mining Safety and the Implementation, Assessment, and Reporting of SMKP is 72.19% (Table 1). In the current legislation, there is no longer a baseline to measure the success of the implementation of SMKP because the implementation of SMKP is prioritized on the implementation applied at the work location according to the conditions of each company. The audit result assessment is high if it has been successfully implemented. The percentage of 72.19% shows that the company has implemented SMKP in accordance with applicable regulations and has been running quite well, however, this percentage shows that there is room for improvement in the implementation of SMKP in the company. This can be seen from the assessment of each element that has not been fulfilled optimally, which of course must be a priority to improve its implementation so that SMKP can run effectively and efficiently in ensuring mining safety at the work location.

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CONCLUSION

The Mining Safety Management System has already been implemented at PT X. Mining Safety Management System in accordance with applicable regulations, demonstrate positive achievements although there are still several areas that need improvement. Judging from the assessment of each element which has not been fulfilled optimally, PT X Mining Safety Management System. In addition, improvements to document control, communication of management review results, and internal audit follow-up are also important steps to improveimplementation of a Mining Safety Management System so that it can run effectively and efficiently in ensuring mining safety at work sites.

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