

Safety Maturity Level Evaluation ReportHisnaniah¹, Arpan Panjaitan², Dawud Firdaus³, Jonter Tamba⁴

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KeywordsEvaluation,
Maturity Level**Abstract**

Safety,

Integrated Mining Safety Management in the mining services business sector, PT Bina Sarana Sukses site PT Antang Gunung Merarus measures the Maturity Level of Integrated SMK3 Implementation based on the K3 cultural approach. The aim of this research is to evaluate the condition of safety culture maturity to improve work safety practices in the operational environment. In carrying out this mining engineering study using a combination of qualitative and quantitative methods. Where the qualitative method for collecting data is through observation and interviews. Meanwhile, the quantitative method for collecting data is through questionnaires to process the data and then determine the results of the research carried out. This technical study approach uses statistical analysis with an explanatory approach. Taking this assessment and audit using Simple Random Sampling is the simplest form of sampling. The number of samples used was 301 samples. The Risk Maturity Model Enterprise Risk Management (ERM) framework and design used above refers to the risk management framework based on ISO 31000:2018, the main model used at PT Bina Sarana Sukses site PT Antang Gunung Merarus for the initial step of identification and preparation for stage one. Achievement of International Standard Organization 31000:2018 as one of the stages of PT Bina Sarana Sukses's ISO Internal Audit plan in 2024. Based on the results of the questionnaire analysis, it can be concluded that the highest percentage of achievement for safety maturity culture indicators and parameters at PT Bina Sarana Sukses site PT Antang Gunung Merarus is 26% at the level of proactive safety awareness.

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Occupational safety and health (K3) is an effort to create a safe, comfortable working atmosphere, and the ultimate goal is to create the highest possible productivity (Siregar, Ahmad, Tanjung, & Tanjung, 2022) . K3 is absolutely necessary to implement in every type of work field without exception. Implementation of K3 can reduce work accidents so that it can increase work efficiency and productivity. Companies consider K3 as an important aspect to protect workers and companies from losses (Darmayanti, 2018) .

The company's obligation to fulfill rules/standards in accordance with the K3 sector in the integrated mining safety management system. Business requirements to obtain audit certificates, licenses and compliance with regulations, rules and other requirements. A company will get a good title if it implements an integrated management system and has been certified by an Independent Audit Board or an auditor who has been appointed by the highest management in the company so that the company's image can improve and it is easy to participate in tenders. If requests or demands for these obligations are not fulfilled, work accidents will often occur due to the weak commitment of top management in protecting worker safety. Based on the description of these conditions, it is necessary to carry out an analysis and assessment of the integrated management system so that plans and corrective actions can be found to reduce the level of work accidents in the workplace and so that similar incidents do not occur repeatedly (Ridasta, 2020) .

In implementing an integrated Mining Safety Management System in the mining services business sector, PT Bina Sarana Sukses site PT Antang Gunung Merarus measures the Maturity Level of Integrated SMK3 Implementation based on the K3 cultural approach. This is the first step in identifying and fulfilling the Decree of the Director General of Mineral and Coal number 10.K/MB.01/DJB.T/2023 dated 22 June 2023 concerning Assessment of the Level of Achievement of Mining Safety Performance to create a safe and healthy work environment and protect workers from work-related accidents and diseases. The K3 culture model is used to assess the level of fulfillment and effectiveness of the management system-based implementation of mining safety. The model developed combines the Hudson, Anglo American and Mineral Industry Risk Management (MIRM) Maturity Models called the UK Coal Journey Model (FOURTH & TWENTITH, 2019) . The safety maturity model with the UK Coal Journey Model explains the maturity level of K3 implementation divided into five stages, namely Vulnerable, Reactive, Compliant, Proactive and Resilient.

The concept of this safety maturity model is in accordance with the development of a safety culture in the mining services business sector (Hermawan & SUDIARNO, 2019) . It is hoped that this concept can help to achieve overall improvement in changes and steps in the safety program and assumes that behavioral and cultural problems can be addressed as early as possible in improving the basic K3 of employees. The concept of safety culture maturity is new and therefore it is important to explore its potential uses for safety improvement. The Safety Maturity Model concept is useful because it allows organizations to determine the current maturity level and the actions required to reach the next level (Kurniawan & Sarno, 2016) .

The term safety culture first appeared in a report prepared by the International Atomic Energy Agency (IAEA) following the nuclear accident known as the Chernobyl disaster in 1986 (Aziz & Djunaidi, 2022) . A public inquiry report argued that poor safety culture was the cause of the accident (Sulistyo, Irwanti, & Lestari, nd) . Safety is a vital aspect in all industrial sectors because it concerns human welfare and life. Safety has become a social and moral responsibility. The welfare and lives of employees as well as social and moral responsibility are not the only reasons for various organizations to consider safety (Azis, 2022).

According to (Sari & Nadjib, 2019) risk maturity can be a very appropriate method for evaluating risk management practices. Risk maturity is a tool for developing a risk maturity model framework which begins by identifying the parameters of risk maturity (PRADITYA, 2021) . Risk maturity can help an organization determine its maturity level and describe its organization's position in implementing risk management (SILALAH, 2017) . also added that in implementing risk maturity you should not only focus on designing the risk maturity model, but also on measuring the risk maturity level and evaluating the implementation of risk management. By carrying out evaluations, it is hoped that the company will make improvements until it reaches a higher risk maturity level (PRADITYA, 2021) . This is because measuring risk maturity level can help companies identify components in their risk management that need improvement.

In measuring risk maturity, the model used is the ISO 31000:2009 approach and only focuses on the risk management process. The use of ISO 31000 to design risk maturity models is suitable to be implemented because the number of organizations in Indonesia that use the ISO 31000 standard always ranks highest compared to other standards and even continues to increase from year to year (Fitriyan & Syairudin, 2016) . However, currently ISO has revised and updated ISO 31000:2009 to become ISO 31000:2018 (Burhan & SE, 2023) . So the use of ISO 31000:2009 designed by (PRADITYA, 2021) is no longer relevant at this time. However, until now ISO 31000:2018 is still not equipped with a risk maturity model and in previous studies the risk maturity model was designed with ISO 31000:2018 as the main model.

In connection with the issuance and socialization of Decree of the Director General of Mineral and Coal Number 10.K/MB.01/DJB.T/2023 dated 22 June 2023 concerning Technical Instructions for Assessment of the Level of Achievement of Mining Safety Performance, all mining companies are required to socialize and internalize the assessment safety maturity level in each company. This assessment is the result of assessing the level of performance achievement as one of the bases for preparing a mining safety work program for 2024 and subsequent years (Muhammad, Sylvia, Fitriani, & Nurhaedah, 2022) .

The Directorate General of Mineral and Coal of the Ministry of Energy and Mineral Resources also held the opening of the Meeting of Directors of Mining Companies for the Provinces of South Kalimantan, West Kalimantan and North Kalimantan which took place in the Ballroom of the Harper Hotel, Banjarmasin. This activity was attended by the Director of Mineral and Coal Engineering and Environment/Chief Inspector of Mines, Plt. Head of the North Kalimantan Province ESDM Service, South Kalimantan Province ESDM Service Representative, Mineral and Coal Mining Safety Coordinator, Mining Inspector Coordinator for the Provinces of South Kalimantan, West Kalimantan and North Kalimantan, Coal Mining Safety Sub-Coordinator, Mine Inspector, Directors and Head of Mining Engineering (KTT) mining companies in the provinces of South Kalimantan, West Kalimantan and North Kalimantan. Also at this meeting, every mining company, especially the Provinces of South Kalimantan, West Kalimantan and North Kalimantan, will carry out and provide Safety Maturity Level Audit guidelines (Sumiarto, 2021) . This program is important because it provides clear guidance on how companies can improve work safety practices. By having a clearer picture of where work safety is at, companies can identify weaknesses and opportunities to improve the effectiveness of their work safety programs. This also helps to measure the results of efforts that have been made to improve work safety (Isliko, Budiharti, & Adriantantri, 2022) .

According to researchers, safety can be improved through effective control of factors that influence safety (Mohammadi, Tavakolan, & Khosravi, 2018). Safety controls consist of three main components: physical controls, human controls, and organizational controls. Physical controls include a safe physical design and environment, human controls involve individual behavior and awareness of safety, and organizational controls include the policies, procedures, and organizational culture that support safety.

The aim of this mining technical study is to measure the maturity safety culture at PT Bina Sarana Sukses job site PT Antang Gunung Meratus, namely to evaluate the condition of maturity safety culture to improve work safety practices in the operational environment. This mining technical study uses several variables including: Safety Maturity Level indicators and parameters; psychological aspects, behavioral aspects, and situational aspects; and Enterprise Risk Management (ERM) based on ISO 31000: 2018. This mining technical study only measures and analyzes based on 3 variables separately and does not analyze the relationship between these variables. This is because this mining technical study is the first step to set a strategy to fulfill the initial steps of identification and preparation for stage one in achieving the International Standard Organization 31000:2018 as one of the stages of PT Bina Sarana Sukses's ISO Internal Audit plan in 2024. Apart from that , this technical study is one of the fulfillments of the Decree of the Director General of Mineral and Coal number 10.K/MB.01/DJB.T/2023 dated 22 June 2023 to assess the level of achievement of mining safety performance in mining companies and fulfill the annual Minerba SMKPA Audit 2023 Element 2. Planning and fulfilling regulations from Minister of Energy and Mineral Resources Decree 1827 K/30/MEM/2018 concerning Guidelines for Implementing Good Mining Engineering Principles.

RESEARCH METHODS

In carrying out this mining engineering study using a combination of qualitative and quantitative methods. Where the qualitative method is for collecting data through observation and interviews to understand the phenomena experienced by research subjects by means of descriptions in the form of level assessments based on a scale of 1 to 5. Meanwhile, the quantitative method is for collecting data through questionnaires to process the data and then determine the results. research conducted. This technical study approach uses statistical analysis with an explanatory approach. The statistical methods used include sampling and analytical hierarchy process weighting. Taking this assessment and audit using Simple Random Sampling is the simplest form of sampling. Simple random samples can be used if a population is homogeneous (has the same population characteristics). The number of samples used was 301 samples.

RESULTS AND DISCUSSION

After carrying out the data collection process using a questionnaire with a total of 35 items regarding the application of the safety culture maturity model which was distributed to 301 respondents with appropriate and determined inclusion criteria, namely based on 4 indicators and the desired parameters, the results were obtained as follows. following.

Table 1. Results of Analysis of Respondents' Questionnaire Answers to Safety Maturity Model Culture Indicators and Parameters

No	Safety Maturity Model Culture Indicators / Parameters	%	Scale
1	Mining Worker Participation	25%	4.2
2	Responsibilities of Work Unit Leaders	25%	4.1
3	Analysis and Statistics of Accidents, Occupational Diseases, Occurrence Due to Occupational Diseases, and Occurrences	24%	4.1
4	Control Efforts Taken	26%	4.2
	Average		4.2

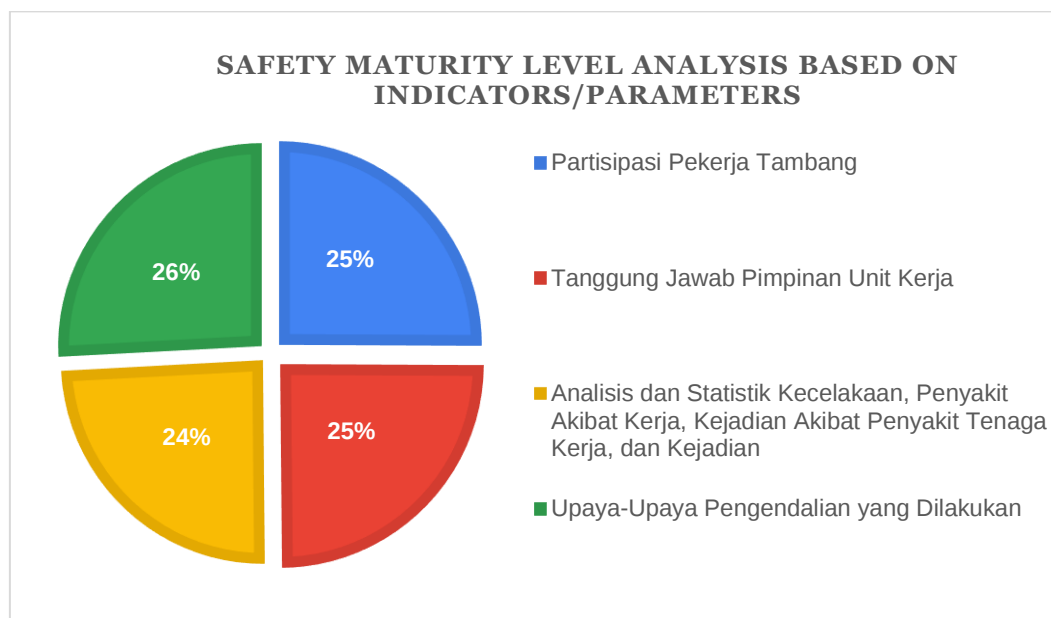


Figure 1. Analysis of Cultural Indicators and Parameters Safety Maturity Model

Based on the table and image above, for the results of the analysis of the questionnaire answers given by respondents regarding the indicators and parameters of the safety maturity culture code above, the results obtained from 301 respondents were that the highest percentage of achievement was 26% on the safety maturity culture indicators and parameters, the level was on a scale of 4.2 (Proactive). The Safety Maturity Culture Indicators/Parameters of the model help to increase the final score in the application of

point 1. Participation of Mining Workers and point 4. Control Efforts carried out by the company in improving the safety maturity model culture at PT Bina Sarana Sukses site PT Antang Gunung Meratus . The lowest percentage achievement results are in the safety maturity model cultural indicators and parameters which are on a scale of 4.1 (Proactive) with the achievement percentage being 24%, especially for indicators and parameters for implementing analysis and statistics on accidents, work-related illnesses, incidents due to labor illnesses. work, and incidents at PT Bina Sarana Sukses site PT Antang Gunung Meratus.

Overall, in the implementation and implementation of the safety maturity model at the PT Bina Sarana Sukses site, PT Antang Gunung Meratus, it is proven by the implementation of control efforts for existing safety problems found in the work place or area, resolved proactively based on the awareness and commitment of PT Bina Sarana Sukses employees. PT Antang Gunung Meratus site. At this stage, employees of PT Bina Sarana Sukses at the PT Antang Gunung Meratus site are aware and are taking proactive steps on their own initiative to control mining safety risks based on governance, mining occupational health management, mining work environment management, engineering and process design management, asset management. mining safety, worker reliability management in mining safety management, change management, emergency management, mining service company management, as well as document management and mining safety records they carry out. This is to support a safety culture in the work area by doing

In addition, the safety culture maturity model at the PT Bina Sarana Sukses site PT Antang Gunung Meratus consists of objects and abilities of employees and management who are able to evaluate periodically and continuously improve corrective actions with employee commitment (PT Bina Sarana Sukses Safety Pledge), joint commitment by the management of PT Bina Sarana Sukses site PT AGM in 2023, commitment of top management of PT Bina Sarana, implementation of performance evaluations every month through the PT Bina Sarana Sukses dashboard (Report Key Performance Index (KPI), Daily Work Instructions (IKH) which influence the mining planning and implementation methods, evaluation of financial controls and engineering techniques to improve and develop existing resources and delivered according to a mutually agreed monitoring and evaluation schedule, as well as conducting safety training for all employees safety culture maturity model used as a tool for organizational development. The maturity measurement instrument model used also allows assessing the company's current situation as well as identifying logical development needs for long-term planning (Juliansyah, 2017) .

The analytical method used for development to evaluate the application of the safety culture maturity model for the level of safety culture maturity is not limited to certain domains such as indicators and parameters of the safety culture maturity model (AKBAR, nd) . However, this assessment tool was also developed for the results of analysis of aspects that influence determining the safety maturity level at the PT Bina Sarana Sukses site PT Antang Gunung Meratus as a pioneer in implementing the Internal Audit Safety Maturity Model for other job sites. This is one of the evaluation tools for corrective action regarding non-compliance with the implementation of safety culture in the work area. As for the results of the data collection process for the questionnaire that was distributed to respondents with inclusion criteria based on aspects that influence the safety maturity level, the following results were obtained.

Table 2 Results of Analysis of Respondents' Questionnaire Answers on Influential Aspects

No	Influential Aspects	%	Scale
1	Psychological Aspects	34%	4.2
2	Behavioral Aspects	33%	4.1
3	Situational Aspect	33%	4.1
Average			4.1

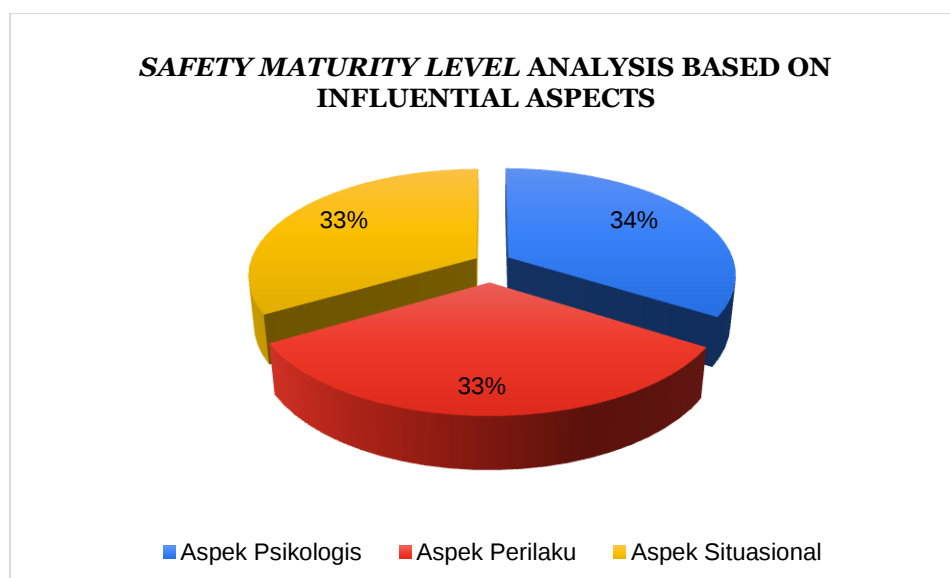


Figure 2 Analysis of Safety Maturity Level based on influential aspects

Based on the data obtained in the table and image above for the questionnaire given by respondents regarding aspects that influence the safety maturity level at the PT Bina Sarana Sukses site PT Antang Gunung Meratus, the indicators obtained from 301 respondents are the highest percentage of achievement in the aspects that influence it, namely 34% in the aspects The psychological and cultural safety maturity level is on a scale of 4.1 (Proactive), especially for the application of the values, attitudes and perceptions of each individual in the organization in viewing K3 matters in the organization at PT Bina Sarana Sukses site PT Antang Gunung Meratus. The results of the percentage of achievement in behavioral and situational aspects are at 33%. The safety maturity level culture is on a scale of 4.1 (Proactive) with the application and implementation of human actions and behavior related to human commitment, both management and employees in managing K3; and system changes implemented by regulations such as policies, procedures, posters, organizational structure slogans, and management systems at the PT Bina Sarana Sukses site of PT Antang Gunung Meratus can be said to be good. This illustrates that the maturity level of risk management, especially in managing K3 and system changes in situations has been implemented, risk management has been included in the category of having been developed and the level of risk management maturity is good (Ikasari, Santoso, Astuti, Septifani, & Armanda, 2021) .

In implementing and implementing an organizational risk management framework or Enterprise Risk Management (ERM) in risk awareness based on ISO 31000: 2018 Risk Management–Principles and Guidelines, organizations need to be accompanied by administrative compliance, communication, coordination and supervision and improvement both internally and top-up. management. This is done so that the organization is able to achieve organizational goals from the company's vision and mission in the maturity of implementing safety culture at the PT Bina Sarana Sukses site PT Antang Gunung Meratus. Therefore, it is necessary to calculate the maturity level of ERM implementation. Organizations need to have sufficient knowledge of this in order to know the maturity level of implementing organizational risk management and be able to continuously improve ERM in the organization (Dipraja, Fuadi, & Rachman, 2021) .

Conceptually, this risk management maturity level model is similar to that issued by the Risk and Insurance Management Society (RIMS), but differs in levels and terms. RIMS adds level zero, namely nonexistent, with levels 1 to 5 having the terms ad hoc, initial, repeatable, managed, and leadership. RIMS issued a Risk Maturity Model (RMM) which can facilitate measuring the level of ERM maturity through planning, communication, as well as monitoring and control guidelines. This RMM equips ERM practitioners by combining the best elements of important models and standards. This model can be applied to all industries and various types of risk, and measures how well risk management is implemented and how

deep it is in the organization. The maturity level is determined in each attribute and the maturity of ERM implementation is determined from the weakest link. The results of the data collection process based on the observation and brainstorming method with PT Bina Sarana Sukses Internal Audit to measure the maturity level of safety culture using Enterprise Risk Management (ERM) attributes based on ISO 31000: 2018 obtained the following results.

Table 3 Enterprise Risk Management (ERM) based on ISO 31000: 2018

NO	CATEGORY	SCALE
1	Leadership and Commitment (ISO 31000:2018) (Bhosale et al., 2017)	3.0
a	Risk management policy	2.0
b	Resource allocation	3.0
c	Risk management communication	4.0
d	Organizational structure support	3.0
e	Stakeholder management	3.0
f	Risk management integration	3.0
2	Design (ISO 31000:2018)	2.7
a	Understanding the organizational context	2.0
b	Determination of roles, authority and responsibilities	3.0
c	Resource	3.0
3	Implementation (ISO 31000:2018)	3.5
a	Communication and consultation	3.0
b	Scope, context and criteria	3.0
c	Risk assessment	4.0
d	Risk treatment	4.0
e	Monitoring and reviewing	4.0
f	Recording and reporting	3.0
4	Evaluation (ISO 31000:2018)	3.0
a	Risk management performance measurement	3.0
b	Achievement of organizational goals	3.0
	Average	3.0
5	Improvement (ISO 31000:2018) (RIMS, 2008)	3.3
a	Adapt to change	3.0
b	Continuous improvement	4.0
c	Resilience and sustainable business	3.0
	Total average	3.1

The design of the risk maturity model for Enterprise Risk Management (ERM) based on ISO 31000: 2018 at PT Bina Sarana Sukses site PT Antang Gunung Meratus which was produced in the table above which has been validated by the SHE Department together with the Internal Audit Team, obtained the average safety maturity culture results at scale 3.1 (Calculative/compliant). The results of observations of the ISO 31000:2018 Enterprise Risk Management model in 5 categories showed that the highest results were in category 4. Implementation with a safety maturity culture average was on a scale of 4 (Proactive). In category 4. Implementation, there is the highest sub-category, namely in sub-category 3. Risk assessment, sub-category 4. Risk treatment and sub-category 5. Monitoring and review, namely the average safety maturity culture results are on a scale of 4.0 (Proactive). Apart from that, the results of observing this model obtained the lowest results in category 3. Design with an average level of safety maturity culture on a scale of 2.7 (Calculative/compliant). In category 3, Design, there is a sub-category that makes the score low, namely in sub-category 1. Understanding the organizational context, namely the results of the safety maturity culture culture, the average level is on a scale of 2.0 (Reactive).

The Risk Maturity Model Enterprise Risk Management (ERM) framework and design used above refers to the risk management framework based on ISO 31000:2018, the main model used at PT Bina Sarana Sukses site PT Antang Gunung Meratus for the initial step of identification and preparation for stage one. achieving International Standard Organization 31000:2018 as one of the stages of PT Bina Sarana Sukses's ISO Internal Audit plan in 2024. The attributes used also come from the definition of each part of the framework in ISO

31000:2018 and are complemented by other attributes obtained from several literature and previous research regarding the design of risk maturity models. The opportunity for this mining engineering study to design the first risk maturity model is to use the ISO 31000 approach as the main model or reference in designing the risk maturity model, which is the reason why this mining technical study uses ISO 31000:2018 as the main model. This mining technical study opportunity is used as a continuous improvement stage which is actually already contained in ISO 9001:2018, ISO 14001:2018, ISO 45001:2018 and ISO 37001:2016.

CONCLUSION

Based on the results of the questionnaire analysis, it can be concluded that the highest percentage of achievement for safety maturity culture indicators and parameters at PT Bina Sarana Sukses site PT Antang Gunung Meratus is 26% at the level of proactive safety awareness. In addition, the mining management system at the company began to involve workers in the improvisational stage of K3 management, changing the top management approach to two-way communication. The risk maturity model for Enterprise Risk Management (ERM) designed using ISO 31000:2018 obtained an average safety culture maturity level of 3.1 (Calculative/comply). However, understanding of K3 is still limited to the management sector and there are differences in worker behavior regarding K3. This mining engineering study creates an opportunity to design a risk maturity model using the ISO 31000 approach as a reference, as well as to carry out continuous improvements in line with other ISO standards that have been implemented by the company.

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