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Increasing the Effectiveness of KPLH SAKTI (Smart, Awareness, Knowledge, Training, and Improvement) Training for the Q2 Period (April-June 2025) as an Effort to Strengthen a Resilient Safety Culture at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara

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Keywords
KPLH Training; Culture Safety; Safe Behavior .

ABSTRACT
This study aims to evaluate and improve the effectiveness of the internal Mining Occupational Safety and Health (KPLH) Training Program (*SAKTI*) at PT Antareja Mahada Makmur Jobsite Mifa, which was previously ineffective in shaping safe employee behavior. The main challenges identified include low training implementation (30.8% of the plan), minimal employee participation (6.2% of 2,830 employees), and the predominance of unsafe behavior as a major cause of workplace accidents. This research employed a quantitative observational approach combined with the Kirkpatrick Four-Level Evaluation Model, covering reaction, learning, behavior, and results. Data were collected through training records, participation reports, and post-training assessments. The implementation of a structured and digitalized KPLH *SAKTI* training system significantly increased training participation from 6.2% in Q1 to 15.3% in Q2, improved implementation realization from 30.8% to 53.8%, and achieved average learning outcome scores above 70, indicating measurable improvements in employee competency and safety behavior. The findings demonstrate that a data-driven, digitally monitored training system enhances the quality, consistency, and accountability of occupational safety training. This structured and digitalized approach can be adopted as a model for industrial safety management systems, contributing to the strengthening of behavior-based safety culture and supporting compliance with the Director General of Mineral and Coal Mining Decree No. 185/2019.

INTRODUCTION

Safety mining is a fundamental element in the implementation of good mining practice. The concept of good mining practice includes aspects of technical mining; mineral and coal conservation; safety and health in work mining; safety operation mining; environmental management in mining; reclamation and post-mining; utilization of technology; engineering capabilities; design, construction, development, and implementation of mining technology (Amponsah-Tawiah & Mensah, 2016; Anggoro & Simorangkir, 2019; Ullah et al., 2018; Van Wyk, 2015). In this context, safety mining plays a central role as the foundation that ensures every stage of mining activities is conducted in a controlled manner, minimizing risks to workers, equipment, and the environment, while ensuring sustainable, productive, and competitive mining operations.

Coal mining activities are among those with a high level of vulnerability to potential hazards, particularly in aspects related to worker safety. Data from the Ministry of Energy and

Mineral Resources (ESDM) in 2019 show that contractor mine workers contributed significantly to mining accidents, accounting for 79% of the total accidents that year. The dominant factors identified as causes of accidents originated from unsafe conditions (33%) and unsafe actions (39%). The high proportion of unsafe actions reflects the still low level of safety behavior among workers. This aligns with the theory put forward by H.W. Heinrich in Industrial Accident Prevention (1931), which states that 88% of work accidents are caused by unsafe actions or unsafe worker behavior. This statement is reinforced by research by Griffin and Neal (2006), which shows a close correlation between safety behavior and workplace accidents.

Occupational Safety and Health Training Mining (KPLH) plays a strategic role in shaping safe behavior among mine workers. Based on the Activator–Behavior–Consequence (ABC) Model framework, worker behavior is influenced by the presence of triggers (activators) such as rules, procedures, and work instructions, and by consequences that arise from their behavior (Atakora & Stenberg, 2020; Kang et al., 2019; Kretschmann et al., 2020; Mrema et al., 2015; Zhijun, 2024). KPLH training functions as an activator that encourages workers to behave according to safety standards, with positive consequences in the form of reduced unsafe actions, increased compliance, and the creation of a safety culture that can be realized.

Previous studies have highlighted the importance of structured safety training in reducing unsafe behavior and workplace accidents, yet several limitations remain in ensuring behavioral transformation and long-term training effectiveness. Griffin and Neal (2000) demonstrated that safety training significantly improves employees' safety knowledge and compliance, but its impact on safety participation—the voluntary behavior supporting organizational safety culture—tends to diminish without continuous evaluation and feedback mechanisms. Similarly, Vinodkumar and Bhasi (2010) emphasized that management commitment and employee involvement are crucial determinants of safety performance; however, their study lacked the integration of digital monitoring systems that enable real-time supervision of training implementation and behavioral outcomes.

Based on the above problem, this research aims to analyze the effectiveness of KPLH SAKTI (Smart, Awareness, Knowledge, Training, and Improvement) Training for the Q2 Period (April–June 2025) as an effort to strengthen a resilient safety culture at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara. The effectiveness indicators are measured based on variables such as participants, implementation, and evaluation of KPLH SAKTI training. The results are expected to contribute to the improvement of safety management systems in the mining sector, providing a replicable model for integrating technology into occupational safety training and supporting compliance with the Director General of Mineral and Coal Mining Decree No. 185/2019.

MET HOD

This study employed a quantitative observational method, utilizing direct observation of the research subjects without any treatment. The observations focused on training-related phenomena that affected mining safety performance at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara. This approach was appropriate for understanding how and why training improvements could enhance safety performance (Amrulloh et al., 2025).

The population consisted of all employees of PT Antareja Mahada Makmur Jobsite Mifa Bersaudara, totaling 2,830 individuals, including group leaders, operators, mechanics, administrative staff, helpers, paramedics, and members of the emergency response team (Amin et al., 2023).

Data were collected through both primary and secondary sources. Primary data were obtained directly by the researchers through measurements of participants' knowledge before and after training, feedback evaluation questionnaires, and post-training behavior observations. Secondary data were gathered from relevant company documents, including business process descriptions, organizational structures, mining safety performance reports, and supporting literature from journals, books, and previous studies.

Quantitative and qualitative analyses were conducted. Data on the achievement of the *KPLH SAKTI* training were analyzed descriptively using statistical measures such as averages, percentages, and trends. Comparisons were made between data from the pre-improvement period of Q1 (January–March 2025) and the post-improvement period of Q2 (April–June 2025) to evaluate changes in training performance. Graphs and tables were used to visualize trends and comparisons clearly. Qualitative analysis was based on the examination of secondary data to identify and interpret information related to the effectiveness of the implemented improvements in enhancing mining safety performance (Amrulloh et al., 2025).

The study applied the Kirkpatrick Model evaluation method (Kirkpatrick & Kirkpatrick, 2006) to assess training effectiveness. Evaluation at Level 1 – Reaction was conducted during and after training to assess participants' responses and satisfaction. Level 2 – Learning evaluation measured participants' knowledge improvement after training sessions through examinations and discussions. Level 3 – Behavior evaluation observed changes in participants' conduct after training completion. Level 4 – Results evaluation assessed the long-term impact of training on improvements in the company's overall safety performance.

RESULTS

Identify Initial Problems and Root Causes

PT Antareja Mahada Makmur Jobsite Mifa Bersaudara has established a Policy that is integrated with the company's management system (AMM-SMT-PD-001 – Mining Occupational Safety and Health Policy, Environment, Quality, Energy and Information Security). In preparing the policy, PT Antareja Mahada Makmur Jobsite Mifa Bersaudara has considered laws and regulations related to business processes and conducted an initial review of the company's condition which includes an assessment of mining safety, environment, quality, energy and information security risks; comparison of KP implementation; assessment of HR efficiency and effectiveness; and involving workers in its preparation.

PT Antareja Mahada Makmur Jobsite Mifa Bersaudara has established a human resources (HR) improvement policy as part of a systematic effort to ensure the competence of its mining workforce. This competency improvement is not only to support productivity but also to minimize the inherently high risk of work accidents in mining companies. This is in accordance with the Decree of the Director General of Mineral and Coal No. 185.K/37.04/DJB/2019 concerning Technical Guidelines for the Implementation of Mining

Safety and the Implementation, Assessment, and Reporting of the Mineral and Coal Mining Safety Management System, specifically Element 1 which regulates the importance of policies, commitment, and management leadership in ensuring workers have the qualifications and skills appropriate to their roles. Thus, the HR improvement policy created by PT Antareja Mahada Makmur Jobsite Mifa Bersaudara represents a form of management commitment to operational safety and sustainability, as well as a direct implementation of the SMKP application (Yin, 2014; Ministry of Energy and Mineral Resources, 2018).

Safety, Health, and Environment (SHE) Department is a department at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara that focuses on creating a safe, secure, healthy, and productive work area and protecting workers from work-related accidents and occupational diseases. The SHE Department has a Key Performance Index (KPI) target for the Accident Frequency Rate (AFR) aspect in 2025 of less than the specified threshold value of 1.94. The following are the Key Performance Indicators for mining safety at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara:

Table 1. Key Performance Indicator of SHE Department of PT Antareja Mahada Makmur Jobsite Mifa Bersaudara in 2025

No	Indicator	Threshold
1	Fatality	0
2	Major Injury	0
3	Minor Injury	0
4	SR (Severity Rate)	0
5	FR (Frequency Rate)	0
6	Occupational Disease (PAK)	0
7	KAPTK (Accident Prevention Program Effectiveness)	0
8	CMR (Case Management Rate)	< 4.02
9	ASR (Accident Severity Rate)	< 136.18
10	MFR (Medical Frequency Rate)	< 179.87
11	TIFR (Total Injury Frequency Rate)	< 38.80
12	AFR (All Injury Frequency Rate)	< 1.94
13	PDFR (Property Damage Frequency Rate)	< 1.58
14	PD Claim Ratio	60.00%
15	Major Environmental Case	0
16	SAP (Safety Achievement Percentage)	95%
17	Mining Safety Performance Assessment	Proactive
18	GMP (Good Mining Practice)	4x Aditama
19	Customer Satisfaction	8
20	SMKP (Mining Safety Management System)	65%

PT Antareja Mahada Makmur Jobsite Mifa Bersaudara, as a mining contractor, is committed to building and improving the competency of its human resources through education and training programs, one of which is in the field of Mining and Environmental Safety (KPLH). Based on the results of the analysis of work accidents at PT AMM Jobsite Mifa Bersaudara, two accidents have occurred causing material damage due to inappropriate motivation. Therefore, a strategy is needed through education and training programs that have a close relationship with AFR, because workers gain knowledge, skills, and safe work attitudes that can reduce the potential for unsafe actions as the main cause of accidents (Najihah et al, 2023).

Based on the evaluation results of the implementation of the KPLH SAKTI training in Q1 2025, 30.8% of the specified module availability was achieved. Meanwhile, the number of workers participating in the training in Q1 2025 was 6.2% of the total worker population of 2,830.

Table 2. Implementation of KPLH SAKTI Training Based on Module Availability for the Q1 2025 Period

Training	Title	Note	Training	Title	Note
Safety	IBPR & JSA	√	*Health*	*Industrial Hygiene*	X
	Inspection planned	X		HIV/AIDS and Drugs	X
	Responsibility & accountability	X		*Fatigue Management*	√
	Investigation accident	√		*Low Back Pain*	X
	Behavior-Based Safety	X		Dust and Breathing	X
	ISO 45001	X	*Environment*	Management Environment Mining	X
	Basic safety	√		Management of B3 and LB3	X
	Working at heights	X		*Basic Environmental Awareness*	X
	Working in space limited closed	X	ERT	*First Aid Training*	√
	Working near water	X		Basic Fire Fighting	√
	Safety workshop	√		*Hydrocarbon Spill Response*	X
	LOTTO	X		It's been done	√
Health	PPE	X		Not Yet Implemented	X

Table 3. Participation of Training Participants from Each Department in the Q1 2025 Period

Department of Agriculture	January	February	March
Center of Excellence	0	2	0
Engineering	0	1 8	12
Human Capital & General Affairs	0	8	6
Plant	0	25	2 8
Production	0	7	56
Supply Chain Management	0	1	0
Safety, Health, and Environment	0	9	5

Through an in-depth analysis of cause and effect using fishbone, the implementation of KPLH SAKTI *training* has not been effective due to the following factors:

Table 4. Fishbone Cause and Effect Analysis of KPLH SAKTI Training

No	Category	What	Why
1	Man	real-time participant monitoring and implementation system.	There is no individual ach monitoring dashboard system that is mutually integrated in a way real time
2		trainer appointment and approval have not been carried out yet.	Not done identification competence internal trainer
3	Method	annual and monthly ach planning commitments yet	There is no mechanism for periodically evaluating the achievement of training plans.
4	Method	Training identification has not been carried out mandatory and additional based on TNA	TNA does not meet the baseline of work positions, risks, mandatory determination and additional training.
5	Method	There is no system for synchronization and periodic review of modules based on the syllabus.	There is no PIC review and monitoring module yet in a way periodically

No	Category	What	Why
6	Method	training evaluation mechanism based on behavioral change.	There has been no collaboration between the training team and the KO team in developing a behavioral change measurement tool.
7	Material	The module has not been prepared according to the type of training	Limitations references and classification type training

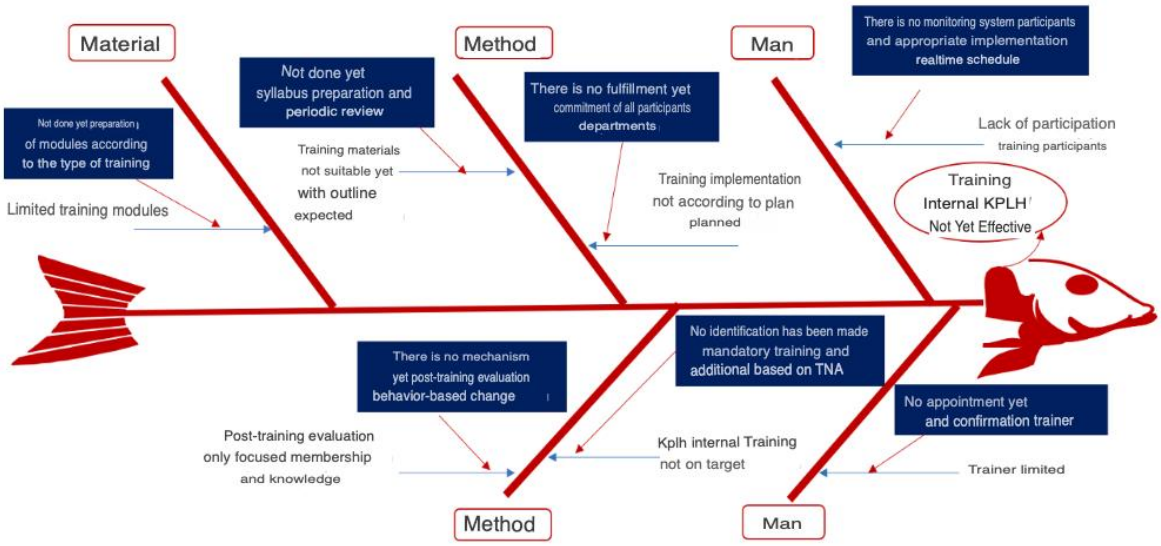
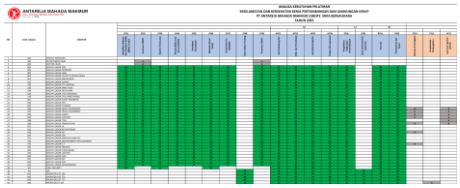


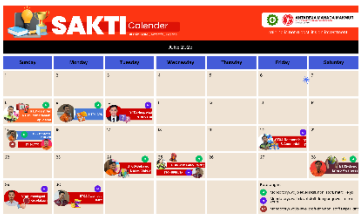
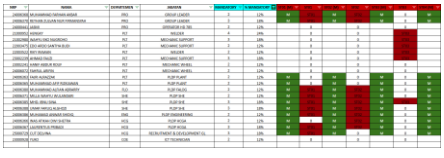
Figure 1. Fishbone Diagram of KPLH SAKTI Training

Solution Implementation and Data Analysis Results

Fishbone cause-and-effect analysis, seven root causes were identified that require corrective action to ensure the implementation of the SAKTI KPLH training is more effective. Corrective actions and implementation to optimize the effectiveness of the SAKTI KPLH training for the second quarter of 2025 are shown in Table 5 as follows:

Table 5. Summary of Corrective Actions to Optimize the Effectiveness of KPLH SAKTI Training Q2 2025 Period

Alternative Solutions	Result Opportunity	Implementation
Preparation of TNA training	Target training appropriate in accordance with analysis need training	
Compilation syllabus training	Training outline delivered in accordance specified standards	

Alternative Solutions	Result Opportunity	Implementation
		
Compilation module training	Delivery material training in accordance with competence expected knowledge	
Compilation schedule and commitment training	Participation participant increased and can measured indicator success implementation training	 
Appointment trainer and crossing trainer	Availability trainer sufficient with involving other departments	
Compilation dashboard tracking achievement of all employees	Preventive action anticipation double training	
Implementation training	Implementation training achieved in accordance specified plan	

Alternative Solutions	Result Opportunity	Implementation
Evaluation post training	Focus analysis learning and behavior	

Post-implementation quantitative data analysis showed significant improvements in training participants, training participant implementation and satisfaction levels, training participant knowledge, and employee behavior evaluations in the Q2 2025 period.

Improvement Participation Participant KPLH SAKTI Training Period Q2 2025

Figure 2 shows trend an increase of 9.1%, from 6.2% to 15.3% if compared to participation Q1 2025 participants with Q2 2025 training period for KPLH SAKTI.

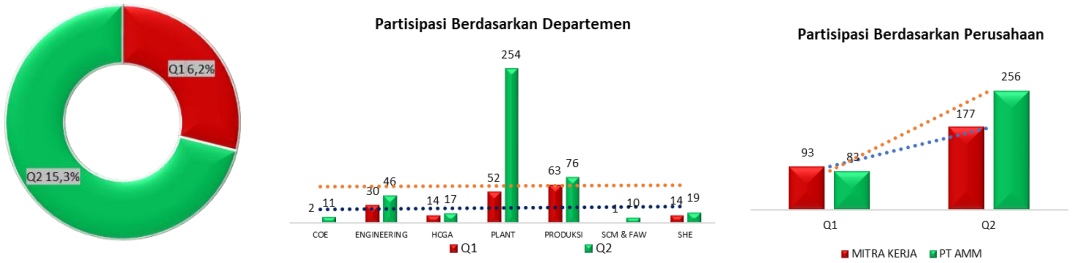


Figure 2. Increase Participation Participant KPLH SAKTI Training Period Q2 2025

Based on the data improvement participation participant KPLH SAKTI training for the Q2 2025 period took place Because existence support leadership department in committed full delegate representative participant for participate in the training. In addition, with existence dashboard monitoring tracking individual achievement make it easier for every worker for access and know achievements involve participation active in KPLH education and training in general real time. Every month researchers create and distribute report implementation KPLH SAKTI training which can be accessible to all departments for can made into material evaluation as well as monitoring efforts towards implementation and participation worker from each department.

Improvement Implementation and Level of Satisfaction Participant KPLH SAKTI Training Period Q2 2025

Figure 3 shows trend improvement implementation training based on module 23%, from 30.8% to 53.8% if compared to implementation KPLH SAKTI training Q1 2025 with period Q2 2025. In Graph 3, the average number of participants KPLH SAKTI training provides satisfaction level assessment 58% very satisfied and 38% satisfied.

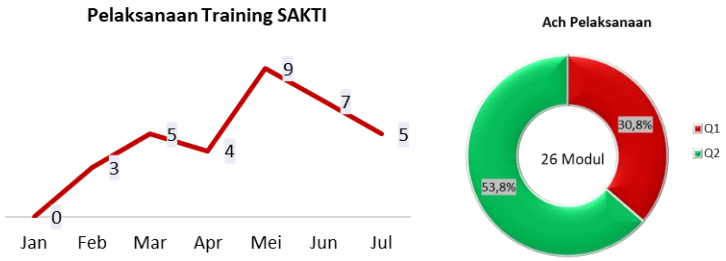


Figure 3. Increase Implementation Based on the KPLH SAKTI Training Module for the Q2 2025 Period

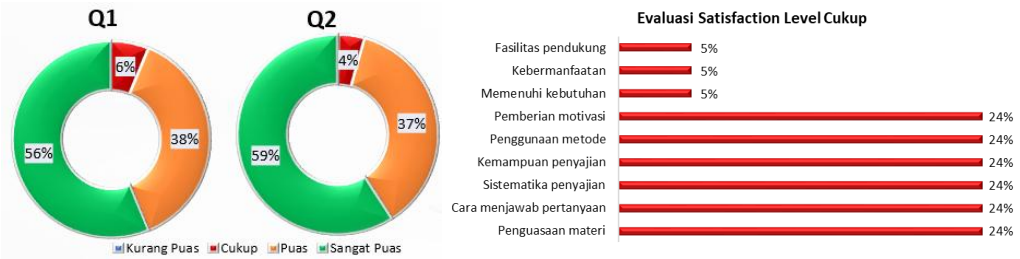


Figure 4. Satisfaction Level Participant SAKTI Forest Management Unit Training

Based on the data improvement implementation KPLH SAKTI training period Q2 2025 based on module happen Because the existence of a special PIC appointed For do module creation and review based on recency knowledge knowledge and suitability standard syllabus so that SHE Department of PT Antareja Mahada Makmur Jobsite Mifa Bersaudara can give facility training based on results review management risks and aspects of KPLH that are accommodated in module training and bulletins module summary training that can accessible in a way real time . Satisfaction level participant KPLH SAKTI training in overall expressed great satisfaction matter This naturally influenced by one of the systems mechanism structured training comparable with the quality obtained by participants.

Improvement Knowledge Participant KPLH SAKTI Training Period Q2 2025

Figure 5 shows trend improvement level knowledge participant training level reaction is measured based on results pre-test 26.2 and learning level measured based on results post-test 28.4. From the results learning level evaluation is carried out analysis deep percentage points necessary materials improved so that understanding and knowledge participant KPLH SAKTI training can implemented with good in his work area.

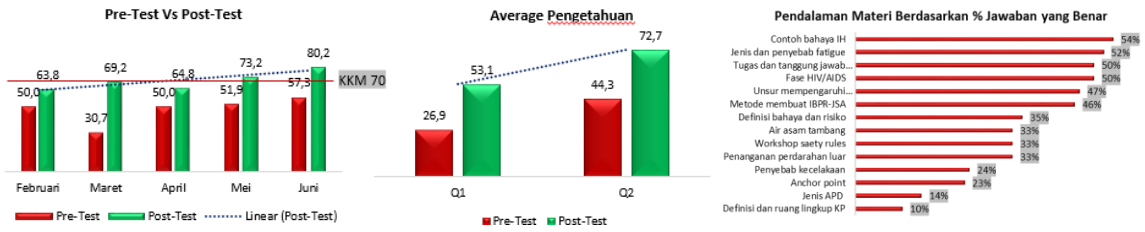


Figure 5. Increase in Knowledge of KPLH SAKTI Training Participants for Q2 2025

Formation Behavior Based Safety for Participants KPLH SAKTI Training Period Q2 2025

Figure 6 is results evaluation behavior participant post KPLH SAKTI training for the Q2 2025 period was conducted with method observation and interviews can know average participant get score 22 out of total score maximum 24. Evaluation This is done on the type basic safety training, safety workshops, LOTO, and blackouts fire basis. Evaluation results post training can be used as base identification behavior in formation culture safety.

Table 6. Formation of Behavior-Based Safety for KPLH SAKTI Training Participants, Q2 2025 Period

No	Evaluation Indicator	Basic Safety		Workshop Safety		LOTO		PAD	
		Score	Max	Score	Max	Score	Max	Score	Max
1	Objective	4	4	4	4	4	4	4	4
2	Related to job	4	4	4	4	4	4	4	4
3	Work steps or principles	4	4	3	4	4	4	3	4
4	Understanding of material	4	4	3	4	4	4	3	4
5	Useful for work (observation)	3	4	4	4	4	4	4	4
6	Useful for work (knowledge)	3	4	4	4	3	4	4	4
Total		**22**		**22**		**23**		**22**	

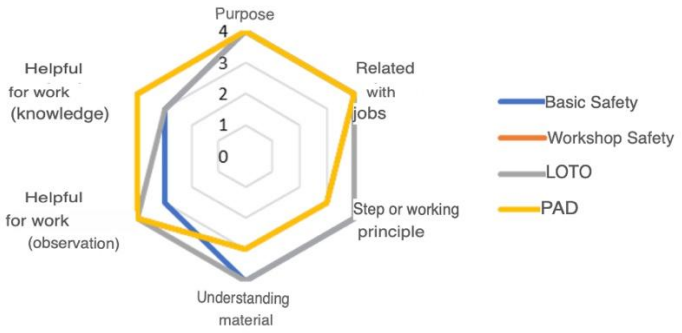


Figure 6. Formation of Behavior-Based Safety for KPLH SAKTI Training Participants, Q2 2025 Period

According to Agustin (2021), K3 knowledge needs to be provided and applied to workers because a person's behavior is also influenced by knowledge. If a worker has good knowledge, his work behavior will also be good. In line with research conducted by Monalisa, et al. (2022) on service workers at PT Agung Automall Jambi Branch, which stated that there is a significant relationship between knowledge and unsafe behavior, with a p-value of 0.028. The lower a person's knowledge, the higher the unsafe behavior they will do, conversely, workers who have high knowledge will be able to distinguish and recognize the dangers around them and can carry out work according to existing procedures, thereby minimizing unsafe behavior. Based on the results of the study of the mining safety performance report document of PT Antareja Mahada Makmur Jobsite Mifa Bersaudara, it shows that there was a decrease in the cause of accidents due to lack of knowledge in Semester 1 2024 as many as 2 cases down

to 1 case and the cause of accidents due to inappropriate motivation in Semester 1 2024 as many as 6 cases down to 4 cases. Tarwaka (2014) stated that knowledge is a crucial domain for shaping one's actions. Good knowledge increases awareness of the importance of safety, thereby reducing unsafe behavior.

CONCLUSION

The study on the effectiveness of KPLH SAKTI (Smart, Awareness, Knowledge, Training, and Improvement) training at PT Antareja Mahada Makmur Jobsite Mifa Bersaudara demonstrated that a structured training system supported by Training Needs Analysis (TNA) and a post-training monitoring and evaluation dashboard significantly enhanced training outcomes. During Q2 2025 period, participant participation increased from 6.2% to 15.3%, training implementation improved from 30.8% to 53.8%, and learning achievement scores exceeded 70, accompanied by notable improvements in workers' safety behavior. These results indicate that KPLH SAKTI played a strategic role in strengthening behavior-based safety culture, complying with the Director General of Mineral and Coal Decree No. 185/2019, and enhancing occupational safety and health (OHS) competencies. Future research should examine the long-term sustainability of these improvements and explore the integration of digital learning analytics to further optimize training evaluation and behavioral impact measurement.

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