

Analysis of Unsafe Acts, Unsafe Conditions, And Near Misses Among Workers At Pertamina Upstream Production Unit In East Kalimantan Region

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Abstract

This research aims to analyze the factors influencing occupational health and safety (OHS) in Pertamina's upstream production units in East Kalimantan, against the backdrop of increasing attention to safety aspects in the oil and gas sector, which often faces high risks related to unsafe acts, unsafe conditions, and near misses. The main issues identified are low worker compliance with OHS protocols and a lack of awareness and participation in safety training. The methodology used is a descriptive qualitative approach through in-depth interviews, observations, and document analysis. The results indicate that compliance with OHS regulations needs to be improved, particularly in the provision of equipment and personal protective equipment (PPE), as well as enhancing training and outreach programs. The frequency of accident prevention evaluations should be increased, and employee participation in decision-making and OHS incident reporting remains low. It is recommended to conduct regular audits, strengthen OHS communication, schedule interactive training, increase evaluation frequency with published results, and enhance discussion forums and transparent reporting systems with incentives to encourage participation.

Keywords: Occupational Safety and Health (OSH), Pertamina, Unsafe Act, Unsafe Condition, Near Miss, Compliance, Awareness, Prevention, Reporting

INTRODUCTION

Occupational health and safety (OHS) is becoming increasingly important worldwide, including in Indonesia, as regulated by Law No. 1 of 1970 to protect workers from the risks of accidents and occupational diseases. In East Kalimantan, rich in natural resources, the mining and oil and gas sectors contribute significantly to the local economy but also face challenges related to safety and the environment. With intensive industrial activities, the risks to the health and safety of workers have increased, prompting the government and industry players to focus on sustainable practices and risk reduction. As a subsidiary of Pertamina, this company is responsible for managing energy resilience and ensuring worker safety through the identification of unsafe conditions and near misses, which greatly influence workforce performance and well-being. The oil and gas management conducted by one of Pertamina's subsidiaries in East Kalimantan has been ongoing for more than 30 years. This management is carried out in the upstream production unit, where around 50 workers are involved in processing using various equipment. Therefore, this production unit has significant potential risks for workplace accidents. With such extensive experience in the oil and gas industry, the company has undergone various changes in management, both in terms of personnel and equipment. Although there are still usable tools, it cannot be denied that some equipment has begun to age and can no longer be used, necessitating replacement or modification of the existing equipment.

Management of the production unit is not without risks and potential hazards that can lead to incidents, ranging from minor to serious accidents. One of the main causes of incidents is unsafe behavior, often stemming from workers' lack of understanding of workplace hazards and insufficient skills. Examples of unsafe acts include not using personal protective equipment (PPE) due to haste, operating equipment without adequate training, using unverified equipment, and relying on experience without proper knowledge of the appropriate tools. Therefore, it is essential for organizations to implement strong safety training programs and create a safety culture that emphasizes individual responsibility in preventing accidents, as well as documenting incidents to evaluate the quality of occupational safety and health practices in place.

In the reporting records of unsafe acts using the HIT (Hazard Identification Tool) categories, several records from the years 2023 to 2024 can be observed, specifically incidents that occurred in the mid-year as follows:

Table 1. Table of Unsafe Acts for the Years 2023 – 2024

Kategori HIT	Mei	Jun	Juli	Agus	Sept	Okt	Nov	Des	Jan	Feb	Mar	Apr	Total
Gravitasi	156	128	0	116	66	110	54	38	12	17	16	15	728
Gerakan	126	78	0	76	50	69	46	32	16	10	9	8	520
Mekanikal	10	9	0	15	1	1	3	1	1	1	1	1	44
Listrik	6	3	0	4	5	9	2	0	0	1	0	0	30
Tekanan	5	15	0	8	4	2	4	4	2	1	1	1	47
Temperatur	73	48	0	30	17	45	3	1	0	0	1	1	219
Kimia	24	17	0	14	13	17	10	2	1	2	3	0	103
Biologi	9	10	0	6	5	5	5	3	0	4	1	1	49
Radiasi	3	0	0	0	0	0	0	0	0	0	0	0	3
Kebisingan	4	14	0	7	1	0	3	1	2	1	0	0	33

Accidents caused by unsafe conditions are often triggered by facilities provided by the company, which may be aging and not undergoing adequate monitoring and inspection. The presence of these unsafe conditions is a serious issue that can result in physical injuries, material losses, and other negative impacts in the workplace. Hazardous situations can include malfunctioning equipment, poorly maintained work environments, inadequate lighting, or poor management of hazardous materials. Incident reporting by the subsidiary will be collected to assess the adequacy of existing facilities, while observations from workers in the field, who are sensitive to health and safety aspects, provide valuable input for the company to make improvements aimed at enhancing occupational safety and health.

In the reporting records of unsafe conditions using the HIT (Hazard Identification Tool) categories, the incidents that occurred in the years 2023 to 2024, specifically in the mid-year, can be observed as follows:

Table 2. Table of Unsafe Conditions for the Years 2023 – 2024

Kategori HIT	Mei	Jun	Jul	Agus	Sept	Okt	Nov	Des	Jan	Feb	Mar	Apr	Total
Gravitasi	530	456	200	471	389	338	283	304	317	393	206	235	4122
Gerakan	572	381	189	289	288	339	287	281	266	268	160	216	3536
Mekanikal	121	109	28	80	59	75	82	82	92	108	54	64	954
Listrik	146	105	56	85	96	100	92	98	93	104	61	67	1103
Tekanan	110	108	30	92	89	87	63	84	60	80	57	71	931
Temperatur	120	62	47	106	75	83	57	52	60	62	50	66	840
Kimia	149	95	28	49	48	62	45	71	62	74	40	35	758
Biologi	117	107	23	51	49	74	75	68	79	80	73	40	836
Radiasi	14	2	1	11	5	9	10	8	12	13	11	5	101
Kebisingan	16	13	9	12	10	9	14	20	17	20	12	11	163

A near miss is an incident that almost causes an accident or loss but is successfully avoided without resulting in damage or injury. Although there are no actual losses, these incidents indicate potential hazards that need to be monitored to prevent future accidents. Examples of near misses include nearly slipping due to a loose handrail, almost falling on a slippery floor, and nearly getting electrocuted by exposed wires. Reporting and analyzing near misses are crucial for taking preventive measures that can enhance safety in the workplace. If not addressed, near misses can lead to larger incidents, with increased severity risks, which can ultimately harm company assets. Below is the data on near misses recorded from the year 2023.

Table 3. Table incident of Near miss 2023

LAPORAN AWAL INSIDEN/ NEAR MISS 2023			
TGL	WAKTU	LOKASI	KEJADIAN
3-Jan-23	8:00	Production	Terjadi Flash fire di cerobong asap
28-Jan-23	19:00	Meeting room	Emergency alarm berbunyi karena tes enggol tidak sengaja
11-Apr-23	9:00	Machine room	Terjadinya salah mengoperasikan mesin di ruang mesin bubut
23-Aug-23	8:00	Workshop	Terjadinya bak sampah terkena percikan api namun tidak sampai rusak

Below is an overview of the Occupational Health and Safety (OHS) performance for the year 2023, collected from several work units within Pertamina's operational area:



Figure 1. KPI HSSE 2023

The pyramid illustration shows that near miss incidents are triggered by unsafe acts and unsafe conditions, prompting the company to implement larger accident prevention programs. In the reporting, the sequence of events begins with property damage, oil spills, reporting of unsafe actions/conditions, and then near misses. Subsequently, there are injury management protocols through first aid, medical treatment case (MTC) for serious injuries, restricted work activities (RWDC) for workers with limited capabilities, and days away from work (DAFW) which records the days workers cannot work due to injuries. Loss Time Injury (LTI) serves as an indicator for evaluating OHS performance. By the end of 2023, safety and health audits conducted by a third-party audit team showed a compliance rate of 89.15 percent in accordance with Government Regulation No. 50 of 2012.

RESEARCH

This qualitative research utilizes data processing with data management collected from the field location, as shown in the following organizational chart:

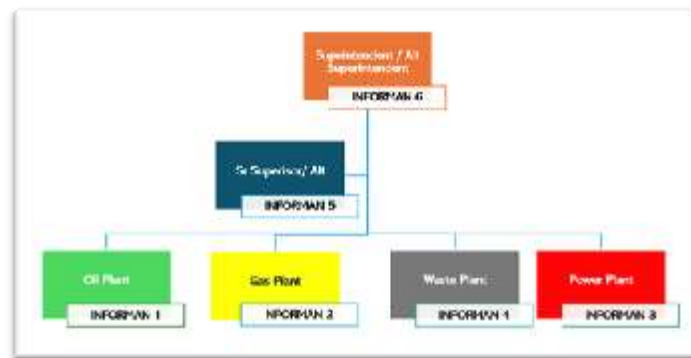


Figure 2. Organization Chart

The data was collected based on verbal and textual interviews is as follows:

INTERVIEW WITH INFORMANT 1

1		Interview Questions for Indicators of Compliance include:
a	Research	"How do you ensure that all workers comply with established safety procedures?"
	Informant	To ensure the first work permit, the work permit includes everything from SOPs to equipment and personal safety, so the first thing we check is the work permit.
b	Research	"What steps are taken to ensure that all workers properly use personal protective equipment (PPE)?"
	Informant	The steps taken involve direct observation; we check directly and ensure that the workers are using the PPE correctly.
c	Research	"How often is occupational health and safety training conducted, and how do you encourage worker participation in such training?"
	Informant	Occupational health and safety training is conducted once a year, but for materials or learning in the workplace, it is done for each worker about 3 to 4 times a year.
d	Research	"What is the management audit process for occupational safety and health in this company, and how often is the audit conducted?"
	Informant	For safety and health audits, we ensure that the equipment used is within its validity period and in proper condition, as well as checking health through annual medical check-ups and health history. Daily health checks are also performed here.
e	Research	"What regulations regarding occupational health and safety must the company comply with, and how do you ensure compliance with those regulations?"
	Informant	Occupational health and safety regulations refer to government standards and those within the company, and we ensure that procedures are followed, such as workers using PPE and meeting standards.
f	Research	"How do you identify unsafe acts, and how do you respond to them?"
	Informant	We observe directly in the field to see whether workers are performing their tasks safely or unsafely. To respond, we are equipped with stop work authority to prevent unsafe actions.
g	Research	"What is the process for recording and reporting work-related accidents in this company?"
	Informant	For recording work-related issues, we refer to reporting to the leader and HSSE.
h	Research	"What occupational health and safety facilities are available in the workplace, and how do you assess their adequacy?"
	Informant	Occupational health and safety facilities at the workplace include PPE such as safety clothing, hats or helmets, and safety gloves. To assess their adequacy, we check their

		quality and expiration dates.
i	Research	"How often is performance evaluation regarding occupational health and safety conducted, and what are the results of these evaluations?"
	Informant	Occupational health and safety evaluations can be conducted once a week or three times a week.
j	Research	"What types of sanctions are applied to workers who violate safety and health procedures?"
	Informant	Sanctions for workers who violate procedures typically involve not granting work permits and providing retraining on occupational safety.

2		Interview Questions for Indicators of Concern include:
a	Research	"How are workers involved in management programs related to occupational health and safety (OHS) in this company?"
	Informant	Workers here are involved in OHS management, meaning all workers are always given the opportunity to provide input or suggestions to OHS management.
b	Research	"How often do you receive feedback from workers regarding safety conditions in the workplace?"
	Informant	Feedback on OHS is often heard, especially regarding personal protective equipment (PPE), including damaged PPE and the unavailability of replacements, as well as work clothing that is unsuitable due to delays in shipments.
c	Research	"What OHS awareness campaigns have been conducted, and what is their impact? Do they affect your facilities?"
	Informant	The campaigns provided to workers are numerous, including slogans displayed in all departments within the work facility.
d	Research	"How do you encourage workers to participate in OHS training?"
	Informant	By explaining the importance of safety to fellow workers so that they adhere to regulations and engage in OHS training.
e	Research	"How often is information shared regarding the importance of health and safety at work?"
	Informant	In our workplace, information sessions are usually held twice a month or, at the latest, once a month.
f	Research	"What do you do if you find an unsafe condition, and how do you prevent others from being affected?"
	Informant	When we find an unsafe condition, the first step is to report it to a supervisor. Competent workers can isolate the area to prevent impact on others.
g	Research	"How does management show support for OHS programs?"
	Informant	Management responds to unsafe conditions by always following up or holding meetings to discuss these incidents and address them.
h	Research	"What activities are conducted to support workers' mental health?"
	Informant	This includes providing awards to motivate workers.
i	Research	"How is the OHS policy implemented to support workers' well-being?"
	Informant	Workers are given rewards that include safety equipment.
j	Research	"How often are workers involved in the risk assessment process at the workplace?"
	Informant	Workers are often involved in risk assessments, such as filling out online safety statements.

3		Interview Questions for Indicators of Prevention Include:
a	Research	"How is the hazard identification process conducted in this company?"
	Informant	There is a JSA program that analyzes hazards before work is carried out.
b	Research	"What steps are taken to control the identified risks?"
	Informant	Workers hold meetings together to agree on the steps to be taken to prevent injuries or work-related accidents.
c	Research	"How often are emergency procedure drills conducted, and what are the results?"
	Informant	Drills are conducted once a month, and the results show improved worker response.
d	Research	"How do you ensure that all workers have access to adequate personal protective equipment?"
	Informant	Observations are made to check whether the equipment used complies with safety procedures.
e	Research	"What preventive measures have been taken to reduce workplace accidents or near misses?"
	Informant	Before starting work, a toolbox meeting is held to ensure that all equipment meets standards and that workers' health is appropriate for the tasks.
f	Research	"How often are health checks conducted for workers?"
	Informant	Routine health checks are conducted weekly, while checks for confined space workers or drivers are done daily.
g	Research	"What technology is used to enhance workplace safety in this company?"
	Informant	Technology such as smartphones is used to share materials about occupational safety and procedures.
h	Research	"How are safety procedures evaluated and updated regularly?"

	Informant	Procedures are updated after any incident and upon review.
i	Research	"What campaigns are conducted to prevent workplace accidents?"
	Informant	Materials are consistently provided to workers, along with slogans displayed throughout the workplace.
j	Research	"How is the incident reporting process conducted, and how quickly are reports followed up?"
	Informant	Reports are made by supervisors or HSSE and are responded to by management as quickly as possible.
4		Interview Questions for Indicators of Reporting Include:
a	Research	"How often are workplace accidents reported according to existing procedures?"
	Informant	Accidents are reported at the time of occurrence.
b	Research	"How long does it take to respond to accident reports?"
	Informant	Response to improvements is made as quickly as possible, within less than one day (24 hours).
c	Research	"How do you assess the quality and accuracy of the safety reports prepared?"
	Informant	Reports are compiled in less than 24 hours and are consistent with the actual conditions in the field.
d	Research	"How often do you report unsafe acts, unsafe conditions, and near misses?"
	Informant	Reports are made 3 to 5 times a month, and near misses are reported about 2 times a month.
e	Research	"How does the company ensure transparency in incident and accident reporting?"
	Informant	The company is open to learning and addressing incidents.
f	Research	"How often do reports receive feedback from management?"
	Informant	Management provides feedback only when a workplace accident or unsafe condition occurs.
g	Research	"What percentage of recommendations from reports are implemented in the company?"
	Informant	Recommendations are always realized at 100%.
h	Research	"What is the incident reporting system in this company, and how effective is it?"
	Informant	Reports are made through supervisors and HSSE.
i	Research	"What training is provided regarding how to report incidents?"
	Informant	Training is provided through HT radios or by interviewing about the incidents.
j	Research	"How often is accident data analyzed for improvements in the safety system?"
	Informant	Accident data is always analyzed quickly for improvements.

Conducting interviews with the same topics with subsequent informants until reaching the last informant, who is at the highest level in the workplace (field).

The data obtained from the interviews will be entered into QDA Miner in the following order: creating interview files from Informant 1 to Informant 6, which will be organized into scribes and then used for coding in the QDA Miner application.

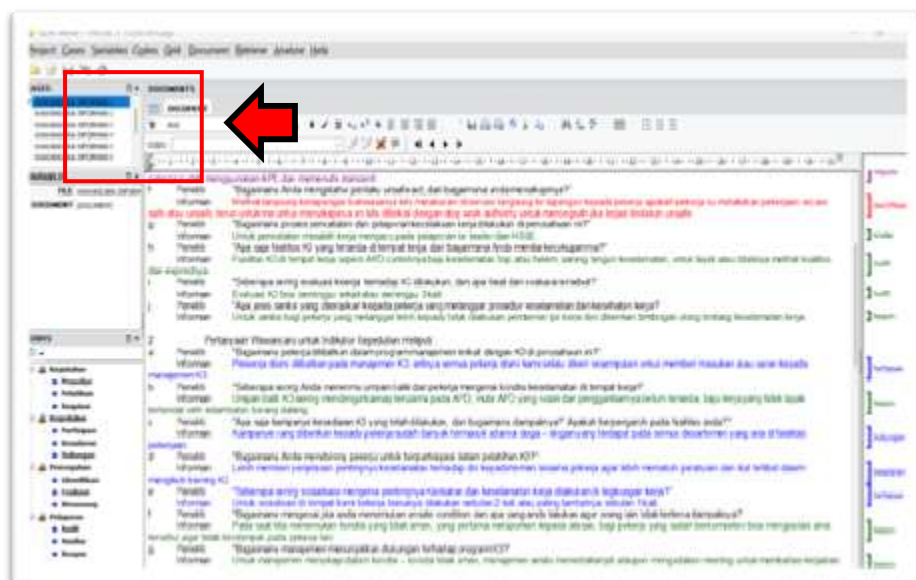


Figure 3. QDA Interview File

Create individual files for Informants 1 to 6 and then organize them into questions that have been clustered. Then, import this data as a file into QDA Miner



Figure 4. QDA Interview Script

Upload the data related to the clustered questions and then organize the informants for data processing.

Create coding related to the grouping of data from the aspects of compliance, concern, prevention, and reporting.

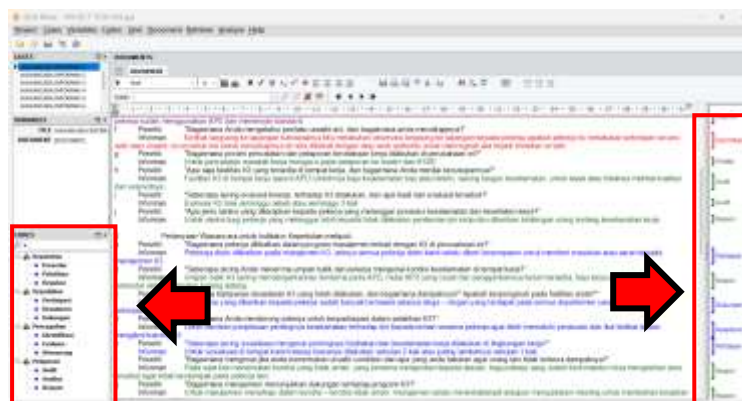


Figure 5 QDA Coding Creation

Coding is performed based on the indicators from the questions that have been created, by categorizing these indicators into codes that correspond to the indicators and then selecting answers that are relevant to the associated codes. The coding is divided into several clusters as follows:

No.	DIMENSI	CLUSTER CODING
1	Compliance	Procedure
2		Training
3		Regulation
4		Participation
5	Concern	Awareness
6		Support
7	Prevention	Identification
8		Evaluation
9	Reporting	Authority
10		Audit
11		Analysis
12		Response

This approach allows researchers to explore and understand various aspects. Researchers process the data using QDA Miner, and the data presented in chart and pie chart diagrams are as follows:

The results from the interview with Informant 1 are shown as follows:

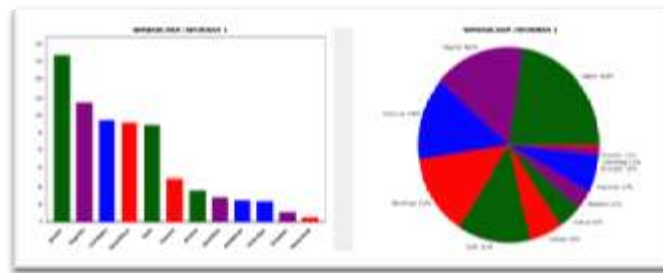


Figure 6. Interview Diagram 1

The results from the interview with Informant 2 are shown as follows:

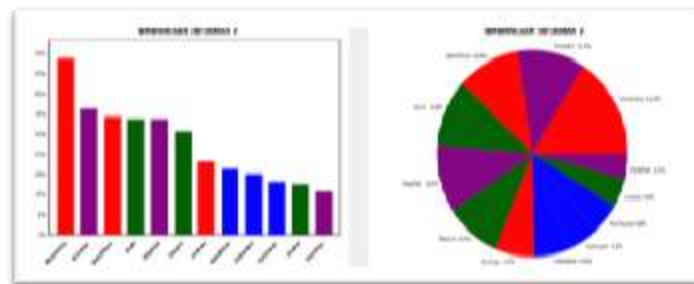


Figure 7. Interview Diagram 2

The following are the interviews that were conducted:



Figure 8. Interviews and Socialization

Data Analysis

Data analysis from Informant 1 shows significant variation in the number of words used across various categories, with 'Respondent' occupying the highest position (162 words), followed by 'Regulation' and 'Participation,' indicating rich information and deep insights. In contrast, the categories 'Authority,' 'Procedure,' and 'Support' have significantly fewer words, indicating a lack of depth in information in those areas and the need for more attention to comprehensively understand the relevant aspects. Meanwhile, the analysis from Informant 2 also shows variation, with 'Authority' recording the highest word count (72 words), followed by 'Procedure' and 'Identification,' which indicate important details. However, the categories 'Analysis,' 'Participation,' and 'Training' show lower word counts, indicating a lack of attention in the interviews. These results emphasize the importance of further exploration in the less discussed categories to gain a more comprehensive understanding.

Table 5. Code Frequency

Category	Code	Description	Count	% Codes	Cases	% Cases
Compliance	Procedure		19	7,8%	6	100,0%
Compliance	Training		19	7,8%	6	100,0%
Compliance	Regulation		23	9,4%	6	100,0%
Concern	Participation		16	6,6%	6	100,0%
Concern	Awareness		11	4,5%	6	100,0%
Concern	Support		20	8,2%	6	100,0%
Prevention	Identification		21	8,6%	6	100,0%
Prevention	Evaluation		11	4,5%	6	100,0%
Prevention	Authority		27	11,1%	6	100,0%
Reporting	Audit		21	8,6%	6	100,0%
Reporting	Analysis		18	7,4%	6	100,0%
Reporting	Response		38	15,6%	6	100,0%

The following is the distribution code diagram chart shown:

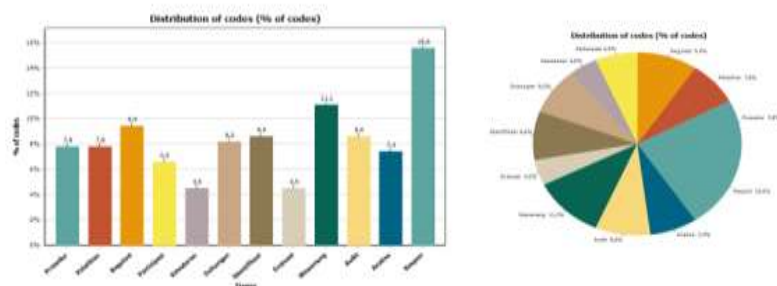


Figure 9. Histogram and Pie Chart of Code Distribution

Similarity Matrix that illustrates the level of correlation between informants in the form of a table or matrix as follows:

Tabel 9. Matrix Between Informants

	YAWANCARA INFORMAN 1	YAWANCARA INFORMAN 2	YAWANCARA INFORMAN 3	YAWANCARA INFORMAN 4	YAWANCARA INFORMAN 5
YAWANCARA INFORMAN 1	1,000	0,549	0,638	0,660	0,484
YAWANCARA INFORMAN 2	0,549	1,000	0,643	0,672	0,544
YAWANCARA INFORMAN 3	0,638	0,643	1,000	0,786	0,520
YAWANCARA INFORMAN 4	0,660	0,672	0,786	1,000	0,754
YAWANCARA INFORMAN 5	0,484	0,544	0,520	0,754	1,000

Node Similarity that illustrates the level of correlation between one informant and another in the form of node relationships is as follows:

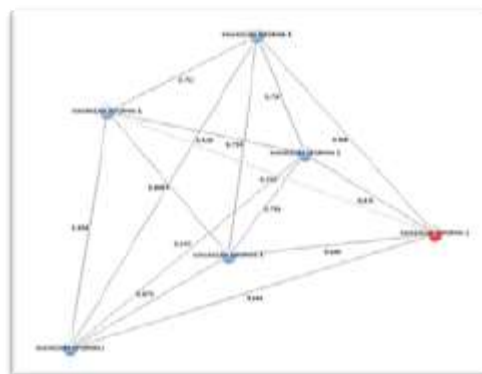


Figure 10. Relationship Between Informants

Data analysis shows the distribution of item codes in percentages, with the top four items including: Response (15.6%), highlighting the importance of feedback in decision-making; Authority (11.1%), reflecting the level of authority in making decisions; Identification (8.6%), which is the process of recognizing important OSH issues for solutions; and Audit (8.6%), as a review to ensure procedures align with objectives. On the other hand, the bottom four items include: Regulation (9.1%), which governs compliance and worker protection; Training (7.8%), which enhances skills and performance; Participation (6.6%), which improves individual collaboration; and Evaluation (4.5%), which assesses the effectiveness of OSH programs. The similarity analysis shows a value of 1.000 on the main diagonal, indicating perfect similarity between the same interviews, while values outside the diagonal reflect the level of similarity between different interviews, with values close to 1.000 indicating high similarity. The interpretation of the matrix is:

Table 6. Table Range

Range	Status
Over than 0.750	High
0.750 – 0.350	Moderate
Less than 0.350	Low

In the provided data analysis, the relationship between the displayed values and the determined categories can be interpreted as follows: The HIGH category (0.750 and above) indicates a strong relationship, with Interviews from Informants 2 and 4 recording the highest value (0.872), signifying significant similarity in views. The MODERATE category (0.750 to 0.350) indicates a moderate relationship, such as between Informants 1 and 4 (0.680), which indicates some similarities but also differences that need to be noted. The LOW category (0.350 and below) indicates a weak relationship, with the only low connection being between Informants 1 and 6 (0.350), reflecting significant differences in views. Overall, the average relationship between informants is moderate to high, with challenges in reaching consensus among informants with different backgrounds or contexts.

CONCLUSION

Conclusion:

1. There is still a need for increased compliance with OSH regulations that protect the interests of all workers in the company regarding the fulfillment of all work and personal equipment needs to achieve 100 percent compliance with safety regulations.
2. There is still a need to increase the number of training and socialization programs on OSH as a process for developing individual skills and knowledge to enhance performance.
3. There is still a need to improve the frequency of evaluations related to the implementation of accident prevention in accordance with OSH procedures to ensure better outcomes.
4. There is still a low level of individual participation in decision-making or activities within the OSH incident reporting system in terms of understanding and transparency.

Recommendation:

1. Increase routine audits to ensure all equipment and personal protective equipment (PPE) meet OSH standards. Adequate procurement policies for PPE should be implemented, and communication regarding the importance of OSH compliance needs to be enhanced through various channels.
2. A regular training and socialization schedule for all workers should be established, using interactive methods such as workshops or focus group discussions (FGDs) to improve understanding of OSH.
3. Increase the frequency of evaluations to assess the effectiveness of accident prevention measures, followed by corrective actions. Evaluation results should be published to enhance transparency and awareness among workers.
4. Enhance discussion forums to encourage worker input in OSH decision-making. Develop an easily accessible and transparent reporting system and provide rewards to increase participation in incident reporting.

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