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Determinant Analysis Related to the Implementation of Occupational Safety and Health Culture in Workers of the Bulango Ulu Dam Project Pt. Hutama-Basuki-Lestari, KSO

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ABSTRACT

K3 culture is the attitudes, values, beliefs, norms, and perceptions that underlie safe behavior in the work process and its practical application to create a safe and healthy work environment for all workers. The formulation of what determinant problems are related to the implementation of occupational safety and health culture in the workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO. This study aims to analyze determinants related to the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO. The design of the quantitative research uses an analytical survey with a Cross-Sectional design. The research population was 43 workers. The sampling technique in this study uses the total sampling technique. Data analysis using Chi-Square test and Rank-Spearman test. The results of this study show that there is a significant relationship between K3 knowledge, K3 training, safety patrol, and safety talk to the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO with a value of $p = 0.000$ ($p \leq 0.05$). It is recommended that companies improve K3 training, especially for workers with low education, increase safety patrol personnel, and make safety talks more interactive. Strict enforcement of sanctions is also needed to strengthen the K3 culture.

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INTRODUCTION

Occupational Safety and Health (K3) is a crucial substance of the constituent parts of a process of industrial activities, both small, medium and large-scale. With the determination of ISO 4500: 2018, companies are required to align the goals to be achieved with the implementation of K3 and improving worker performance which has an impact on the company's revenue (Glebova et al., 2023).

Globally, occupational safety and health (K3) has been made a priority where various countries have implemented it but with the large number of existing workers, as well as the change of personnel (in and out) in a certain period of time is a challenge in the implementation of this K3 culture, this will also be more difficult when there are new workers who do not have experience and an academic basis about the K3 culture (Sari et al., 2023).

According to Cooper, safety culture is the result of interactions between organizations, workers, and jobs, which needs to be implemented by all resources at every level. The implementation of safety culture depends on the vision and mission of the organization and does not have fixed indicators because of its abstract and different nature in each organization. Key indicators of safety culture include management commitments, regulations and procedures, communication, worker involvement, competence, as well as the social environment of workers reflected in their perceptions (Setiono & Andjarwati, 2019).

The optimal implementation of K3 culture requires not only commitment from the government and

companies, but also the importance of K3 knowledge, K3 training, Safety Talk and Safety Patrol in its application. (Dewi et al., 2024).

The Bulango Ulu Dam is one of the national strategic projects that stands on an area of 483.05 ha. This project has a strategic role in overcoming the increasing demand for water. On the other hand, the construction of this dam is expected to be able to reduce flooding by 84.62%, has an inundation area of 614.72 ha and is able to provide irrigation benefits for 4,194 ha of rice fields. This dam will also be a 4.96 MW mini-hydro power plant (PLTM) and will supply 2.2 m3 of clean water per second to Bone Bolango Regency, Gorontalo City (Hutama Karya, 2024).

The results of the initial survey using a questionnaire of 10 workers of the Bulango Ulu Dam construction project in the Drilling and Grouting section of the K3 culture questionnaire found that 6 workers had poor K3 cultural application, 2 workers had insufficient K3 knowledge, 5 workers had sufficient knowledge, and 3 workers had good knowledge. In addition, there are also 6 workers who have never participated in K3 training. In the aspect of safety patrol, 7 workers assessed that the implementation of safety patrols was optimal, while 3 workers assessed it as less than optimal. In Safety Talk, 8 workers rated this program as effective, while 2 workers considered it less effective.

The results of this initial survey were strengthened by the results of interviews with the HSE PT. Hutama-Basuki-Lestari, KSO, the application of K3 culture to construction workers in the Drilling and Grouting section is quite good, this is because the company has provided PPE in accordance with their respective fields of work. However, the reality on the ground shows that the implementation of K3 culture does not always go smoothly. There are some workers who have not implemented the K3 culture properly.

Based on this description, the researcher is interested in conducting a research with the title "Determinant analysis related to the application of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO".

METHOD

The research was carried out for approximately 1 month starting in November 2024 in the Drilling and Grouting work area of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO. The type of research used is an analytical survey using a cross sectional design. The population in this study is all workers in the Drilling and Grouting section as many as 43 workers. The sample in this study uses a total sampling technique.

Data collection in this study used questionnaires. Data analysis used chi square test and spearman rank correlation test.

RESULTS

Characteristics of respondents

Table 1 Distribution of the number of workers by age in the Drilling & Grouting section.

Age	Sum	
	n	%
17 – 25 Years (Late Teens)	7	16.3
26 – 35 Years (Early Adult)	23	53.5
36 – 45 Years (Late Adult)	6	14.0
46 – 55 Years (Early Seniors)	6	14.0
56 – 65 Years (Late Seniors)	1	2.3
Total	43	100

Source: Sonang et al., 2019 & Premiere Date 2025

Based on table 1, the largest number of workers is in the age group of 26 – 35 years old as many as 23 people (53.5%). Meanwhile, the least number of workers is found in the age group of 56 – 65 years old as 1 person (2.3%).

Distribution of the number of workers by last education

Table 2 Distribution of the number of workers based on the last education of the workers in the Drilling & Grouting section.

Final education	Sum	
	n	%
Elementary/Equivalent	9	20.9
Junior High School/Equivalent	13	30.2
High School/Vocational School/Equivalent	20	46.5
Diploma 3/Academic	1	2.3
Total	43	100

Source : Primary Data 2025

Based on table 2, the largest number of workers is found in the last education group of high school/vocational/equivalent as many as 20 people (46.5%). Meanwhile, the least number of workers is found in the Diploma 3/Academic education group as much as 1 person (2.3%).

Distribution of the number of workers by length of service

Table 3 Distribution of the number of workers by working period in the Drilling & Grouting section.

Tenure	Sum	
	n	%
≤3 years (New)	34	79.1
>3 years (Old)	9	20.9
Total	43	100

Source: Kurniasari & Ibrahim, 2022 & Primary Data 2025

Based on table 3, the largest number of workers is found in the ≤3-year working period group of 34 people (79.1%). Meanwhile, the least number of workers is found in the >3-year working period group of 9 people (20.9%).

Univariate Analysis

Distribution of the number of workers based on the implementation of K3 culture

Table 4 Distribution of the number of workers

K3 Culture	Sum	
	n	%
Good	16	37.2
Pretty Good	7	16.3
Not Good	20	46.5
Total	43	100

Source: Primary Data 2025

Based on the table, 4 workers who have a K3 culture in the category of poor are 20 people (46.5%). Meanwhile, workers who have a fairly good K3 culture are at least 7 people (16.3%).

Distribution of the number of workers based on K3 knowledge

Table 5 Distribution of the number of workers based on the knowledge of K3 workers in the Drilling & Grouting section.

K3 Knowledge	Sum	
	n	%
Good	8	18.6
Enough	13	30.2
Less	22	51.2
Total	43	100

Source: Primary Data 2025

Based on the table of 5 workers who have K3 knowledge, the most people in the under-category are 22 people (51.2%). Meanwhile, workers who have good K3 knowledge are at least 8 people (18.6%).

Distribution of the number of workers based on K3 training

Table 6 Distribution of the number of workers based on the training of K3 workers in the Drilling & Grouting section.

K3 Training	Sum	
	n	%
Ever Followed	12	27.9
Never Follow	31	72.1
Total	43	100

Source: Primary Data 2025

Based on the table, the 6 workers who have never participated in K3 training are 31 people (72.1%). Meanwhile, workers who have participated in K3 training are at least 12 people (27.9%)

Distribution of the number of workers based on safety patrol

Table 7 Distribution of the number of workers based on safety patrol workers in the Drilling & Grouting section.

Safety Patrol	Sum	
	n	%
Optimal	11	25.6
Quite Optimal	16	37.2
Not Optimal	16	37.2
Not Optimal	16	37.2
Total	43	100

Source: Primary Data 2025

Based on the table of 7 workers who assessed the most safety patrols in the category of not optimal and quite optimal, each amounted to 16 people (37.2%). Meanwhile, those who assessed safety patrol in the optimal category were at least 11 people (25.6%).

Distribution of the number of workers based on safety talk

Table 8 Distribution of the number of workers based on the safety talk of workers in the Drilling & Grouting section.

Safety Talk	Sum	
	n	%
Effective	11	25.6
Less Effective	15	34.9
Ineffective	17	39.5
Total	43	100

Source: Primary Data 2025

Based on the table of 8 workers who assessed the most ineffective category of safety talk , there were 17 people (39.5%). Meanwhile, workers who assessed the safety talk category as effective were at least 11 people (25.6%)

Bivariate Analysis

The relationship between K3 knowledge and the application of K3 culture in Drilling & Grouting workers.

Table 9 Cross-tabulation between K3 knowledge and the application of K3 culture in Drilling & Grouting workers.

Knowledge K3	K3 Culture						Sum		*p value*	*r value*
	Good		Pretty Good		Not Good		n	%		
	n	%	n	%	n	%				
Good	8	100	0	0.0	0	0.0	8	100	0,000	0,838
Enough	7	53.8	5	38.5	1	7.7	13	100		
Less	1	4.5	2	9.1	19	86.4	22	100		
Total	16	37.2	7	16.3	20	46.5	43	100		

Source: Primary Data 2025

Based on the table of 9 workers, the most workers in the K3 category of knowledge amounted to 22 people, with 19 people (86.4%) having a poor K3 culture amounting to 1 person (4.5%). Meanwhile, the least number of workers in the K3 category of good K3 knowledge is 8 people, with those who have K3 culture in the good category of 8 people (100%).

The results of the spearman's rho test of the relationship between K3 knowledge and the application of K3 culture obtained a Pvalue value = 0.000 ($p < \alpha$ 0.05), meaning that there is a relationship between K3 knowledge and the application of K3 culture in Drilling and Grouting workers. With a correlation coefficient value (r = 0.838), it means that the level of strength of the relationship (correlation) is classified as very strong.

The relationship between K3 training and the application of K3 culture in Drilling & Grouting workers.

Table 10 Cross-tabulation between K3 training and the application of K3 culture in Drilling & Grouting workers.

K3 Training K3	K3 Culture						Sum		*p value*
	Good		Pretty Good		Not Good		n	%	
	n	%	n	%	n	%			
Ever Followed	12	100	0	0.0	0	0.0	12	100	0,000
Never Follow	4	12.9	7	22.6	20	64.5	31	100	
Total	16	37.2	7	16.3	20	46.5	43	100	

Source: Primary Data 2025

Based on the table of the 10 most workers, there are 31 workers who have never participated in K3 training, with the K3 culture of the poor category amounting to 20 people (64.5%) and the good category amounting to 4 people (12.9%). Meanwhile, the least number of workers who have participated in K3 training is 12 people, with the K3 culture in the good category amounting to 12 people (100%).

The results of the Chi-Square statistical test showed that the relationship between K3 training and the application of K3 culture was obtained with a Pvalue value = 0.000 ($p < \alpha$ 0.05), meaning that there is a relationship between K3 training and the application of K3 culture in Drilling and Grouting workers.

The relationship between safety patrol and the application of K3 culture to Drilling & Grouting workers.

Table 11 Cross-tabulation between safety patrol and the application of K3 culture in Drilling & Grouting workers.

Safety Patrol	K3 Culture						Sum		*p value*	*r value*
	Good		Enough Good		Less Good		n	%		
	n	%	n	%	n	%				
Optimal	10	90.9	1	9.1	0	0.0	11	100	0,000	0,802
Quite Optimal	6	37.5	5	31.3	5	31.3	16	100		
Not Optimal	0	0.0	1	6.3	15	93.8	16	100		
Total	16	37.2	7	16.3	20	46.5	43	100		

Source: Primary Data 2025

Based on the table, 11 workers who assessed the safety patrol category were not optimal, the most were 16 people. With K3 culture, the poor category amounted to 15 people (93.8%) and the fairly good category amounted to 1 person (63.3%). Meanwhile, the workers who assessed the optimal category safety patrol amounted to at least 11 people with the K3 culture of the good category amounting to 10 people (90.9%) and the good category amounting to 1 person (9.1%).

The results of the spearman's rho test of the relationship between safety patrol and the application of K3 culture were obtained with a Pvalue value = 0.000 ($p < \alpha$ 0.05), meaning that there is a relationship between safety patrol and the application of K3 culture in Drilling and Grouting workers. With a correlation coefficient value ($r = 0.802$), it means that the level of strength of the relationship (correlation) is classified as very strong.

The relationship between safety talk and the application of K3 culture in Drilling & Grouting workers.

Table 12 Cross-tabulation between safety talk and the application of K3 culture in Drilling & Grouting workers.

Safety Talk	K3 Culture						Sum		*p value*	*r value*
	Good		Enough Good		Less Good		n	%		
	n	%	n	%	n	%				
Effective	10	90.9	0	0.0	1	9.1	11	100	0,000	0,754

Less Effective	6	40.0	5	33.3	4	26.7	15	100		
Ineffective	0	0.0	2	11.8	15	88.2	17	100		
Total	16	37.2	7	16.3	20	46.5	43	100		

Source: Primary Data 2025

Based on the table of 12 workers who assessed the most ineffective category of safety talk, there were 17 people. With K3 culture, the poor category amounted to 15 people (88.2%) and the good category amounted to 2 people (11.8%). Meanwhile, workers who assessed the safety talk category as effective at least 11 people with K3 culture in the good category of 10 people (90.9%) and not good 1 person (9.1%).

The results of the spearman's rho test showed that the relationship between safety talk and the application of K3 culture was obtained with a Pvalue value = 0.000 ($p < \alpha$ 0.05), meaning that there was a relationship between safety talk and the application of K3 culture in Drilling and Grouting workers. With a correlation coefficient value (r = 0.754), it means that the level of strength of the relationship (correlation) is relatively strong.

DISCUSSION

The relationship between K3 knowledge and the application of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO.

Based on the results of the spearman's rho test, the relationship between K3 knowledge and the application of K3 culture was obtained with a Pvalue value = 0.000 ($p < \alpha$ 0.05). With a correlation coefficient value (r = 0.838), this relationship is very strong, which means that the higher the knowledge of K3, the better the application of K3 culture in the workplace. This is because workers with a good understanding of K3 are more aware of the dangers in the work environment, more obedient to safety procedures, and more disciplined in implementing the K3 culture. However, many workers do not understand the purpose of K3 and do not know that they often engage in unsafe behavior in the workplace, such as ignoring the use of PPE or not following SOPs. This ignorance causes a low application of K3 culture. A work environment dominated by workers with good K3 knowledge tends to create a stronger K3 culture

According to Seprinaldi (2023) that the implementation of good K3 needs to be done through increasing the knowledge of K3 workers through Safety Talk, K3 education, and K3 training. This effort is important to be implemented because high K3 knowledge in workers will cause a positive change in attitudes in job security. This positive attitude can be maintained by regulations, both in the production process, work environment, and workers.

This is in line with research conducted by Dewi et al (2024) that the higher the worker's knowledge about K3, the more capable he is in applying the K3 culture in every work activity, and vice versa. Differences in employee knowledge levels in understanding occupational safety and health are natural. This is because employees have different educational backgrounds, different ages, and even the abilities of each employee are clearly different.

Research conducted by Ramdani & Prasetya (2022) based on test results Chi-Square value Sig 0,002 ($p < \alpha$ 0.05), it shows that there is a relationship between the level of K3 knowledge and efforts to implement the K3 culture in employees. This conclusion is strengthened by the calculation value Chi-Square > of table values Chi-Square (12.766 > 5.9915). Therefore, the higher the employee's knowledge of K3, the more capable the employee will be in applying K3 in their work activities, but on the other hand, if the employee's knowledge about K3 is lacking or low, the ability to apply K3 will also be not good.

The relationship between K3 training and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO.

Based on the Chi-Square statistical test, the relationship between K3 training and the application of K3 culture with a Pvalue value = 0.000 ($p < \alpha$ 0.05) means that there is a relationship between K3 training and the application of K3 culture in Drilling and Grouting workers. This is because safety patrols are not carried out or are not carried out optimally, so the implementation of K3 culture in the workplace becomes ineffective. Workers also tend to ignore safety procedures because they feel unsupervised when starting work and are not reminded to work according to procedures and do not use personal protective equipment or work in an unsafe manner. This causes the K3 culture to be weak, the number of accidents increases, and the work environment becomes unsafe.

The Human Error Theory put forward by James Reason highlights that human error in the work environment is often caused by several key factors, including a lack of training and skills. Workers who do not receive adequate K3 training may not understand the risks or effective ways to avoid them.

This is in line with research conducted by Suci Wulandari, (2023). Lack of adequate K3 training can be a problem in the construction industry. Many workers do not receive sufficient training to recognize the appropriate implementation of the K3 culture. Inadequate K3 training can increase the likelihood of workplace accidents and reduce workers' ability to respond appropriately to emergency situations.

Based on research conducted by Hardiman et al (2023) that the test results Chi-Square shows that there is a relationship between training and K3 Culture. Where FRIDAY which is 0.000 which means FRIDAY < α 0.05 shows that Ho was rejected. This means that if nurses follow training and a structured K3 culture, this can improve good service in the hospital.

The relationship between safety patrol activities and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO.

Based on the results of the spearman's rho test, the relationship between safety patrol and the implementation of K3 culture was obtained with a Pvalue value = 0.000 (p < α 0.05). With a correlation coefficient value (r = 0.802), this relationship is very strong, which means that the more optimal the implementation of safety patrols, the better the implementation of K3 culture in the workplace.

This is because supervision in the safety patrol does not directly check the completeness of PPE before work and does not remind workers to implement safety procedures correctly. This makes workers less disciplined in implementing K3 because there is no consistent control from the beginning. Without regular checks and reminders, workers may feel that the use of PPE and compliance with procedures are not mandatory, resulting in a weak K3 culture in the workplace. Therefore, the effectiveness of safety patrols in building a K3 culture is highly dependent on the extent to which they ensure the implementation of safety from before the work begins.

According to Arianto (2022) that the supervision of K3/Safety Patrol is a driving factor to shape the existence of K3 cultural behavior. With the supervision of the Safety Patrol intensely the worker will comply with the K3 procedure well, it can be said that with the supervision of the Safety Patrol then it can encourage workers in implementing K3 culture in the field.

This is in line with research conducted by Prianti, (2025). Workers who do not implement the K3 culture in the field will receive a reprimand and Punishment according to what has been determined. In addition, workers who do not use personal protective equipment for three consecutive times will be given a violation report letter.

Based on research conducted by Supardi & Muliawan (2021) that the supervision of K3/Safety Patrol is significantly related to the K3 culture in construction workers. Analysis Chi-Square Shows value P=0.000, which is smaller than 0.05, means that there is a significant relationship between K3 supervision and safe worker behavior.

The relationship between safety talk activities and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO.

Based on the results of the spearman's rho test, the relationship between safety talk and the application of K3 culture with a Pvalue value = 0.000 (p < α 0.05).With a correlation coefficient (r = 0.754), this relationship is relatively strong, this is because the more often safety talk is carried out, the stronger the K3 culture in the workplace. Safety talk is an educational medium and reminder for workers, so that safety becomes part of their habits and mindset. If safety talks are carried out regularly and effectively, it shows that the K3 culture in the company has developed well. On the other hand, if safety talks are rarely done or just a formality, this could be a sign that the K3 culture is still weak.

According to Muslim & Harianto, (2021) Safety Talk It plays an important role in increasing workers' knowledge about the importance of implementing occupational health and safety culture in the course of work operations to prevent work accidents.

This is in line with research conducted by Jufri et al (2024) that workers who follow Safety Talk have better K3 cultural behavior compared to workers who do not follow Safety Talk.

Research conducted by Ananda et al (2023) By statistical test results using Chi-Square Obtained Scores Pvalue of 0.000, because the probability value α < 0.05 then Ho is rejected and Ha is accepted, which means that there is a relationship between the application Safety Talk to the K3 culture in PT. Pelindo Container Terminal New Makassar Terminal II.

CONCLUSION

There is a relationship between K3 knowledge and the application of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO with a Pvalue value = 0.000 (p < α 0.05).

There is a relationship between K3 training and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO with Pvalue = 0.000 (p < α 0.05).

There is a relationship between safety patrols and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO with Pvalue = 0.000 (p < α 0.05).

There is a relationship between safety talk and the implementation of occupational safety and health culture in workers of the Bulango Ulu Dam project of PT. Hutama-Basuki-Lestari, KSO with Pvalue = 0.000 ($p < \alpha$ 0.05).

SUGGESTION

For academics

It is hoped that this research can encourage the strengthening of K3 education by integrating work safety materials in the curriculum. Academic institutions can also collaborate with industry to provide field experience through internships or project-based training.

For companies

Improved K3 training, especially for workers with low education levels, minimal work experience and optimization of safety patrols, as well as the effectiveness of safety talk with more interactive methods, for example holding simulations/role-playing by demonstrating the correct actions when facing emergency situations. In addition, it can also use hands-on demonstrations such as how to wear PPE correctly, or interactive quizzes with small prizes, can increase workers' attention and motivation. Stricter enforcement of sanctions is also needed to create a deterrent effect that strengthens the K3 culture in the workplace.

For the next researcher

It is expected to consider other factors related to K3 culture, such as worker motivation, leadership style, and psychosocial aspects in the workplace.

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