

Relationship between Knowledge and Fatigue with Unsafe Behavior in Classification Workers

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Abstract

A work accident is an unwanted and unexpected event caused by unplanned factors. One of the factors causing work accidents is personal factors, which include a lack of knowledge, expertise, and motivation, as well as physical and mental problems. Based on the results of previous studies, unsafe behaviour is one of the main causes of work accidents. Therefore, it is necessary to research to determine the relationship between personal factors such as knowledge, skills, and fatigue with unsafe behaviour in welding workers. The purpose of this study is to identify the relationship between personal factors and unsafe behaviour in welding workers in order to find appropriate preventive methods to minimize the occurrence of unsafe practices and work accidents. The results showed a significant relationship between knowledge and unsafe behaviour, with a significance value of 0.001. The correlation coefficient between knowledge and unsafe behaviour is -0.547, which indicates a strong relationship.

Keywords: knowledge; skills; work accident; welding workers.

1. Introduction

Work accidents are unwanted and unexpected events due to unplanned factors related to work in the company. Occupational accident incidents are unexpected events that cause bodily or material damage due to contact with kinetic, electrical, chemical, heat, and other sources. There are four factors related to work accident incidents: humans, equipment, materials, and the environment [1].

Based on the annual report of the Employment Social Security Administration Agency (BPJS), the number of work accidents always increases yearly.

Table 1. Number of Accident Cases

No	Year	Number of Cases
1	2020	221.740
2	2021	234.370
3	2022	265.334

Table 1 shows the number of work accident cases from 2020 to 2022. In 2020, 221,740 work accident cases were recorded. This figure increased to 234,370 in 2021 and 265,334 in 2022.

Three factors cause work accidents: human factors, the environment, and equipment. Human factors or human behaviour are the main cause of industrial accidents. Attitudes towards working conditions, accidents and safe work practices are important things that must be implemented and implemented. Occupational safety and health training is also important in preventing industrial accidents. Using Personal Protective Equipment (PPE) is also important to reduce the impact of work accidents.

The second factor is environmental factors which include the work environment's design, the workplace's position, and the noise in the work area. Designing a safe work environment from the start can reduce the risk of work accidents. However, there are also unsafe designs in practice. The position of the workplace also affects the risk of work accidents. Working at height is certainly more risky than working in an open environment. Noise in the workplace area is also one of the causes of work accidents.

Work accidents are unwanted and unexpected events due to unplanned factors related to work in the company. Three factors cause work accidents: human factors, the environment, and equipment.

Environmental factors include noise, air temperature, and work environment design. Noise can reduce quietness in the workplace and interfere with work efficiency. Air temperatures that are too cold or too hot can also affect work efficiency. Normal and moderate air temperatures will increase production power and reduce the possibility of work accident incidents.

Equipment factors include the condition of the machine and the position of the machine. Poor engine condition needs to be updated or repaired to maximize its role. Adequate security can also support the machine's state to be repaired independently. The machine's position can also affect workers' security and safety.

Several theories have been developed about work accidents, especially those related to causative factors. Development of the domino theory states that every industrial accident incident is caused by five successive causes, which are visualized as dominoes. This theory explains that work accidents can arise due to habits, one's mistakes, personalities, and unsafe conditions, all of which can have an impact on accidents and injuries [2]. Bird and Germany later expanded this theory. Work accidents directly result from unsafe behaviour and conditions [3]. Research shows that 85% of work accidents are caused by unsafe behaviour [4].

Based on research conducted by an expert, 76% of work accident incidents are caused by unsafe behaviour, 22% are caused by a combination of unsafe behaviour and unsafe conditions, and 4% are caused by unsafe conditions [5]. From these data, it can be seen that most industrial accident incidents are caused by unsafe behaviour.

One of the concepts that state the main triggers for unsafe behaviour and unsafe conditions are individual factors and work factors [3].

Personal factors or personal factors include a lack of knowledge, skills, and motivation, as well as physical and mental problems. Knowledge is an important aspect that influences a person's behaviour. Research shows a relationship between knowledge about unsafe practices and unsafe behaviour in workers.

Therefore, it is necessary to study further the relationship between personal factors such as knowledge, skills, and fatigue with unsafe behaviour in workers to find appropriate preventive methods to minimize the occurrence of unsafe practices and work accidents.

Welding work has threats that can result in accidents or serious illness. These threats include welding flashes, electric shock, gas dust, welding sparks, explosions, fire, and falls. Industrial accidents often occur in the workplace, including electric shock, being crushed, slipping, tripping, falling, pressure, and fire. Several incidents of work accidents that often occur are crushing injuries and falls caused by unsafe worker behaviour.

Based on the concept of the loss causation model and the results of previous research, many work accident incidents are caused by unsafe acts. Therefore, it is necessary to research to determine the relationship between personal factors such as knowledge and fatigue with unsafe behaviour in welding workers. The purpose of this study is to identify the relationship between personal factors and unsafe behaviour in welding workers in order to find appropriate preventive methods to minimize the occurrence of unsafe practices and work accidents.

2. Materials and Methods

This study is analytical because it analyzes the relationship between two factors: the dependent and independent factors. This study is an in-depth study that collects research data and information

without directly treating the subject. Based on the time of review, this study was a cross-sectional study that was carried out at the same time in the Welding Workshop with a total of 12 subjects. Samples were taken from all welding employees in the welding workshop. The factors studied included dependent factors related to unsafe behaviour and independent factors, which included level of understanding or skill and fatigue. Primary data was obtained through observation and questionnaires. Univariate analysis was used to display data in tabular form, while bivariate analysis was used to determine the relationship with the Spearman correlation test $\alpha = 0.05$ using SPSS.

3. Results

Skills result from knowledge obtained after someone senses a certain phenomenon through the five senses, namely sight, hearing, smell, taste, and touch. The skills learned by the welder include understanding work safety and comfort, work hazards, threats that may arise from welding activities, use of PPE, and operating standards and work procedures that apply in the work environment [6].

Table 2. Welder Knowledge Univariate Test Results		
Skills, Knowledge and Understanding		
Knowledge Quality	Frequency	Percent %
Not safe	7	41.2%
Less Safe	6	35.3%
Safe	4	23.5%
Total	17	100.0%

Based on the table above, seven welders are unsafe (41.2%), six welders are less safe (35.3%), and four welders have safe knowledge (23.5%). Although most welders know occupational safety and health in the work environment, a lack of knowledge can lead to unsafe actions. Another personal factor is fatigue, which varies from person to person but can reduce productivity, work strength and stamina. The fatigue studied is the fatigue level of the welder about the sensations and complaints experienced.

Table 3. Welder Fatigue Univariate Test Results		
Fatigue		
Fatigue Rating	Frequency	Percent %
Tired	11	22.0%
Less Tired	4	29.3%
Very tired	2	48.8%
Total	41	100.0%

From the data above, four welders were not tired (29.3%), 11 welders felt tired (22.0%), and two welders felt very tired (48.8%). Most of the welding workers feel tired while working. Dangerous behaviour can trigger incidents of work accidents that can harm employees or the industry. The unsafe behaviour studied in this research includes activities not by standards, from planning equipment completeness to carrying out welding activities that are not by standards but can still be carried out, which can cause work accidents and work affect problems.

Table 4. Univariate Test Results for Welder's Unsafe Actions		
Unsafe actions		
Fatigue Rating	Frequency	Percent %
Not safe	6	35.3%
Less Safe	6	35.3%
Safe	5	29.4%
Total	17	100.0%

Based on the table above, there are six unsafe welders (35.3%), six unsafe welders (35.3%), and

five safe welders (29.4%). Most welders feel insecure or unsafe at work.

3.1 Test Bivariate Analysis of the Relationship between Knowledge and Unsafe Actions

The bivariate test determines the relationship between knowledge and unsafe actions by welding workers. From the analysis of the results of the bivariate test, it can be concluded that there is a significant relationship between the knowledge of welders about occupational safety and health and the unsafe behaviour they engage in at work.

Table 5. Relationship between Unsafe Acts and Knowledge

		Unsafe Actions	Knowledge
Spearman's rho	Correlation Coefficient	1.000	-.574
	Say. (2-tailed)	-	.001
	N	17	17
	Correlation Coefficient	-.574	1.000
	Say. (2-tailed)	.016	
	N	17	17

Based on the output above, it is known that the value of Sig. (2-tailed) of 0.001. Because of the value of Sig. (2-tailed) < 0.05, then there is a significant relationship between knowledge and unsafe actions. From the SPSS output, a correlation coefficient of -0.547 is obtained, indicating that the relationship between knowledge and unsafe acts is strong. The correlation coefficient is negative (-0.547), so the direction of the relationship between knowledge and unsafe acts is negative.

4. Discussion

The analysis results show that several factors influence work accidents in welders, including knowledge and fatigue. Data shows that most welders feel insecure or insecure at work. This can be caused by a lack of knowledge about occupational safety and health and dangerous behaviour that can trigger work accident incidents.

The results of the bivariate analysis test showed a significant and strong relationship between knowledge and unsafe actions, with a negative relationship. This means that the higher the knowledge of welders about occupational safety and health, the lower their possibility of taking unsafe actions. Therefore, companies need to increase the knowledge of welders about occupational safety and health through training and the use of appropriate PPE to reduce the risk of work accidents.

In addition, fatigue can also affect the risk of work accidents. High fatigue can cause a decrease in productivity, work strength and stamina, which can increase the risk of work accidents. Therefore, companies must ensure that welding workers do not experience excessive fatigue.

Overall, the analysis results show that increasing knowledge about occupational safety and health and reducing fatigue can help reduce the risk of work accidents in welders.

5. Conclusions

The discussion above concludes that several factors influence work accidents in welding workers, including knowledge and fatigue. Lack of knowledge about occupational safety, health, and dangerous behaviour can increase the risk of work accidents. The results of the bivariate analysis test showed a significant and strong relationship between knowledge and unsafe actions, with a negative relationship. This means that the higher the knowledge of welders about occupational safety and health, the lower their possibility of taking unsafe actions. Therefore, companies need to increase the knowledge of welders about occupational safety and health through training and the use of appropriate PPE to reduce the risk of work accidents.

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