Periodicals of
Occupational Safety and Health
Vol. 4, No. 2, October 2025, pp. 29-35
e-ISSN: 2962-584X
http://journal2.uad.ac.id/index.php/posh/index

The Relationship Between Unsafe Action and Work Accidents in Production Workers in CV. SP Aluminum, Yogyakarta

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ARTICLE INFO

Article history
Received 27 August 2025
Revised 1 October 2025
Accepted 18 October 2025

Keywords
Work Accidents
Unsafe Action
Production Workers

ABSTRACT (10PT)

Background: Based on data from the Social Security Administration Agency (BPJS) Employment, it is stated that in 2019-2021 cases of work accidents continue to increase. According to Heinrich's domino theory, 88% of work accidents are caused by unsafe *action*, 10% are caused by *unsafe conditions*, and 2% are unavoidable (*acts of God*). CV. SP Aluminum is an aluminum craft industry in Yogyakarta engaged in casting, melting, and household appliances such as pans, pots, boilers, and others. From the results of interviews with workers, it was found that as many as 4 people had suffered scratches and 2 people had suffered injuries to their legs. Work accidents that occur are caused by unsafe action carried out by workers during the production process. The purpose of this study is to determine the relationship between unsafe action and work accidents in production workers in CV. SP Aluminum Yogyakarta City. **Methods:** This study used a Cross-sectional research design with *Chi-Square* analysis. The sample of this study amounted to 52 people obtained by *total sampling* technique. The instrument used was a questionnaire to find out the work accidents experienced and unsafe behaviors carried out by the respondents. **Results:** The results showed that there was a relationship between unsafe action (ρ= 0.001; PR=0.463) with work accidents in production workers at CV. SP Aluminum Yogyakarta City. **Conclusion:** There is a relationship between unsafe action and work accidents in production workers in CV. SP Aluminum Yogyakarta City

1. Introduction

Azzahra et al. (2023), reported that the rate of work accidents in Indonesia is still high [1]. Data from the Employment Social Security Administration Agency (BPJS) shows that in 2019 there were 210,789 cases of work accidents and in 2020 it increased to 221,740 cases. In 2021, the number of work accidents increased to 234,370 cases [2]. Pertiwi research (2016) shows that 88% of work accidents are caused by operational errors. Operational errors occur because employees violate standard operating procedures (SOPs), ignore safety warnings, make procedural errors, use work safety equipment that does not meet standards or is inadequate, operate faulty machinery, and do not receive adequate training [3].

Heinrich's domino theory states that 88% of workplace accidents are caused by unsafe action, 10% by unsafe conditions, and 2% by unavoidable events (acts of God). Furthermore, statistical data from Indonesia shows that 80% of workplace accidents are caused by unsafe actions, while 20% come

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Vol. 4, No. 2, October 2025, pp. 29-35
e-ISSN: 2962-584X

from unsafe conditions [5]. Irzal (2016) identified that unsafe behavior, inadequate knowledge and skills, undetectable physical defects, fatigue, inadequate protective equipment and work clothing, hazardous substances, poor ventilation and lighting, as well as unsafe and ineffective equipment or machinery, can all cause accidents [6].

CV. SP Aluminum is one of the centers of the aluminum craft industry in Yogyakarta engaged in casting, smelting, souvenir making, and household appliances such as pans, pots, boilers, and others. However, the aluminum processing process in the Company is still carried out manually, using heavy and hazardous equipment, and the production area is very hot so that workers in the area have a high work risk that can endanger safety and health. The production process of aluminum crafts at CV. SP Aluminum is divided into several stages, namely the preparation of raw materials, aluminum melting, casting or the process of inserting molten aluminum into the product mold, finishing 1 which is grinding and grinding, finishing 2 is turning and polishing. There are several potential hazards that risk causing work accidents in the process of making aluminum crafts. The process of manufacturing this aluminum-based household product is at risk of having work accidents such as being hit by aluminum plates, being hit by aluminum molded iron, fingers being cut or injured by sharp tools, being stepped on by fine aluminum flakes, scratches due to sharp aluminum edges, and hearing loss due to noise from the grinding process.

Based on the results of a preliminary study and a brief interview with the work supervisor at CV. SP Aluminum Yogyakarta City found that in the production process there are still workers who engage in unsafe behavior such as being less careful or careless, often joking while working, using shorts when working, especially in the aluminum smelting part, often taking off clothes while working, and smoking while working. The results of direct interviews with workers were obtained as many as 4 people had suffered injuries scratched by aluminum edges while grinding, 2 people had suffered injuries to their legs due to stepping on aluminum flakes. Based on this background, this study was conducted with the aim of finding out the relationship between unsafe action and work accidents in production workers at CV. SP Aluminum Yogyakarta City.

2. Methods

This study uses a quantitative research methodology using a cross-sectional design. This research was carried out at CV. SP Aluminum, Jalan Mendungan No.VII/548, Giwangan, Umbulharjo District, Yogyakarta City, Special Region of Yogyakarta. The research time was carried out from March to April 2025.

The population in this study is all production workers at CV. SP. Aluminum with a total of 52 people. The number of samples used in this study was 52 people obtained by total sampling technique. The data collection instrument used is a questionnaire was developed by the researcher according to the conditions at the research site and has been tested for validity and reliability. The instrument consists of 10 items on unsafe behavior and 9 items on work accidents. The validity test results showed that all items had a significance value of < 0.05, thus declaring them valid. The reliability test showed a Cronbach's alpha value of 0.832 for unsafe action and 0.776 for work accidents, thus declaring all items reliable. The univariate analysis in this study produced a distribution table of frequencies and percentages of the data collected such as the incidence of work accidents, the type of work accident experienced, the work behavior and the type of unsafe action committed by the worker. This bivariate analysis was carried out with a statistical test, namely the Chi Square test because the measurement scale used was the nominal scale for the variable of work accidents, and the ordinal scale for the variable of unsafe behavior.

3. Results and Discussion

3.1. Results

3.1.1. Characteristics of Respondens

Table 1. Overview of Respondent Characteristics

Characteristic	n	%
Gender		
Man	52	100,0
Woman	0	0,00

Characteristic	n	%
Age		
17-25 years old	2	3,8
26–35 years old	19	36,5
36–45 years old	17	32,7
46-55 years old	14	26,9
Education		
SD	6	11,5
JUNIOR	20	38,5
SMA	26	50,0
Length of Work		
New tenure (≤ 5 years)	17	32,7
Long working period (> 5 years)	35	67,3

3.1.2. Univariat Analysis

3.1.2.1. Unsafe actions carried out by production workers in CV. SP Aluminum, Yogyakarta City

Table 2. Frequency Distribution of Respondents Based on Work action

No.	Action	Frequency (people)	Percentage (%)
1.	Safe	34	65
2.	Unsafe	18	35
	Total	**52**	**100**

Based on table 2, of the 52 respondents who are production workers at CV. SP Aluminium in Yogyakarta City, most of them showed safe action, namely 34 people (65%), while unsafe action was 18 people (35%).

3.1.2.2. Work accidents in production workers at CV. SP Aluminum Yogyakarta City.

Table 3. Frequency Distribution of Respondents Based on Work Accident Incidents Experienced

No.	Work accidents	Frequency (people)	Percentage (%)
1.	Ever	35	67
2.	Never	17	33
	Total	**52**	**100**

Based on table 3, the above can be seen from 52 respondents to the production workers at CV. SP Aluminium Yogyakarta City, most of the workers have experienced work accidents as many as 35 people (67%), while those who have never had work accidents are 17 people (33%).

3.1.2.3. The type of work accident experienced by the production workers at CV. SP Aluminum Yogyakarta City for the last < 2 years

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Table 4. Frequency Distribution of Respondents Based on the Type of Work Accident Experienced in a <2 Year

No.	Types of Work Accidents	Sum	
		Frequency (people)	Percentage (%)
1.	Hit by a heavy object	0	0
2.	Pinched by objects	0	0
3.	Being punctured or cut by a sharp object	22	22
4.	Scratched by pointed or sharp objects	22	22
5.	Electrocution	3	3
6.	Injured or torn leg by sharp objects	10	10
7.	Hearing loss due to machinery or work tools	18	18
8.	*Heat stress* or heat stress due to hot temperatures	24	24
9.	Fractures due to engine failure	0	0
	Total	**99**	**100**

Based on table 4, the types of work accidents that are most experienced by production workers in CV. SP Aluminium, Yogyakarta City, during the last ≤ two years was Heat Stress, which was experienced by 24 people (24%). On the other hand, the least common work accidents are being hit by large objects, being hit by objects, and breaking bones, because no worker has reported experiencing these incidents.

3.1.3. Bivariat Analysis

3.1.3.1. The relationship between unsafe action and work accidents in production workers in CV. SP Aluminum Yogyakarta City

Table 5. Cross-Tabulation of Behavioral Variables with Work Accidents

Behaviour	Work Accidents				Total		P- Value	GOLD (CI 95%)
	Ever		Never					
	N	%	N	%	F	%		
Safe	14	26,9	20	39	34	100	0,001	0,088 (0,30 – 0,71)
Unsafe	16	30,8	2	4	18	100		
Total	30	57,7	22	42,3	52	100		

Based on table 5. above, it can be seen that there are 34 workers who behave safely, 14 people (26.9%) of whom have experienced work accidents and 20 people (39%) of whom have never had work accidents. Meanwhile, 18 workers who behaved unsafely, 16 people (30.8%) of whom had experienced work accidents and 2 people (4%) of whom had never experienced work accidents. The results of *the chi-square* test of the action variable with work accidents obtained a p-value of 0.001 (p-value <0.05), so there is a significant relationship between

unsafe action and work accidents. Meanwhile, the *prevalance ratio* (PR) value of workers with unsafe action experienced a work accident of 0.463 times (95% CI 0.30 - 0.71) was greater than that of workers with unsafe action.

3.2. Discussion

This study shows a correlation between unsafe action and work accidents in manufacturing workers in CV. SP Aluminum, Yogyakarta City. According to Heinrich's (1980) theory of dominoes, one of the main causes of accidents, which accounts for 88% of all incidents is unsafe action [7]. Unsafe action refers to actions that deviate from established safety standards and principles, which have the potential to endanger the safety of others, the environment, or oneself. This suggests that human behavior plays a significant impact on the risk of accidents [8].

The results of this study are in line with the research of Nasution et al (2024) on 65 PT X workers which showed a considerable correlation between dangerous behavior and work accidents. The majority of work accidents occur as workers joke or chat while working, which can distract focus and increase the risk of accidents [9]. Another study conducted by Zulkarnaen and Ramdhan (2023) shows that unsafe action is related to the phenomenon of work accidents, in other words, unsafe actions carried out by workers contribute greatly to the increased risk of work accidents in the workplace [10].

Based on the results of the study, smoking at work is one of the most risky unsafe actions carried out by production workers in CV. SP Aluminum Yogyakarta City, with the highest number in the category that is most often done. Workers usually smoke at work because of long-standing habits or nicotine dependence that make smoking a habit of daily life, including at work. In addition, smoking is also often used as a coping mechanism for stress or stress in the workplace, especially in environments that require a high level of focus or in people with mental disorders. This habit is also made possible by unstrict regulations and a lack of oversight over smoking bans in the workplace [11].

Based on the results of interviews with the production work supervisor at CV. SP Aluminum Yogyakarta City, revealed that work accidents are mostly caused by human factors, especially unsafe behaviors such as smoking while working and repeatedly maintaining improper body positions, joking or chatting with other workers, working in a hurry, carelessly and carelessly.

The findings of this study show that heat stress, which is caused by high temperatures, is the most common type of work accident experienced by production workers in CV. SP Aluminum in Yogyakarta City, with the highest incidence recorded < in the last 2 years. This is due to a closed or poorly ventilated working environment that worsens conditions as hot air is trapped and fresh air circulation is limited. In addition, the lack of a cooling system or mechanical ventilation keeps the temperature around the workplace high for a long time as well as the use of personal protective equipment that does not absorb sweat. All of these factors create a hot work environment that triggers heat stress if not accompanied by adequate mitigation efforts.

Another accident that is often experienced by production workers at CV. SP Aluminum Yogyakarta City is pierced or cut by sharp objects and scratched by pointed or sharp objects. The cause of being punctured or cut by sharp objects and scratching pointed or sharp objects due to exposure to the edge of the pan in a pan making worker usually occurs because the surface of the edge of the pan that has not been smoothed has sharp edges and has the potential to injure the skin Workers who are negligent in using personal protective equipment, such as gloves, or who use gloves that are no longer suitable for use exacerbate this scenario. In addition, the process of cutting and shaping the pan done manually or without adequate tools increases the risk of direct contact with the sharp part [12].

Based on the results of interviews with the work supervisor of the CV production department. SP Aluminium Yogyakarta City, work accidents that occur are more caused by human error and unsafe behavior carried out by workers, such as lack of care, joking with colleagues while on duty, and acting rashly. Even though it is classified as a minor work accident, the work accident is still a serious problem for the company because if it is not immediately known, it will have a serious impact in the future. Therefore, CV. SP Aluminium Yogyakarta City strives to conduct debriefing before work and consistently applies the 5S methodology (side/concise, arrange/neat, sasap/clean, sosoh/care, and torch/diligent) and conduct briefings before work.

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Unsafe action is intrinsically linked to workplace accidents, as employees' actions while carrying out their responsibilities can affect their own safety. If workers do not take protective measures against potential hazards in the work environment, the risk of accidents will be even greater. On the other hand, employees who are disciplined and careful in following safety procedures can lower the likelihood of accidents [13]. It is important for workers to be aware of the use of personal protective equipment (PPE), remain vigilant while working, and maintain cleanliness and regularity in the work area to prevent work accidents [14].

Therefore, it can be concluded that one of the causes of work accidents in CV production workers. SP Aluminum Yogyakarta City is an unsafe behavior. Unsafe ction can be reduced or eliminated through modification of adverse work habits and attitudes. As a result, to reduce the danger of unsafe action, all workers or employees can be trained to be more disciplined in using PPE [15]. Furthermore, CV. SP Aluminum should increase supervision of employees to ensure their concentration on tasks and discipline those who exhibit deviant action or engage in activities that endanger workplace safety, such as smoking in designated places, socializing with colleagues during work, and displaying hasty attitudes without due care. Regular socialization and training on safe work practices is essential for all production employees at CV. SP Aluminum. This step aims to improve knowledge, skills, and form a safer work attitude [16].

4. Conclusion

Based on the results of research that has been conducted on the relationship between unsafe action and work accidents in production workers at CV. SP Aluminum Yogyakarta City, it can be concluded that based on the results of *the Chi-Square* test (α=0.05), the results (ρ=0.001) < (α=0.05) were obtained, meaning that there is a relationship between unsafe behavior and work accidents in production workers at CV. SP Aluminum Yogyakarta City. It was also obtained with an OR value = 0.088, meaning that workers who engage in unsafe behavior have a 0.088 chance of having a work accident.

Declaration

Acknowledgments: Thank you for CV SP Aluminium Yogyakarta

Conflicts of Interest: The authors declare no conflict of interest.

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