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Analysis of determinants of work accidents in fabrication workers in the steel structure workshop area at PT X in 2024

Sukriyadi[1], Januar Ariyanto[2], Triana Srisantyorini[3], Aragar Putri[4]
[1-4]Magister Kesehatan Masyarakat, Universitas Muhammadiyah Jakarta, Jakarta, Indonesia

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ABSTRACT

Accidents are unexpected, undesirable events and can cause material and life losses. Accident prevention must be carried out based on the control hierarchy and the root causes of the accident. Purpose: The aim of this research is to know the determinants of work accidents among fabrication workers in the steel structure workshop area at PT X in 2024. The research method uses a cross sectional design. The sample was 58 respondents from a population of 112 workers at PT Data were collected using a questionnaire. The data was tested using the chi square test. The research results showed that of 58 respondents, 26 (44.8%) had experienced work accidents. Variables are age (P=0.126), education level (P=1.000), length of service (P= 0.126), length of work (p=0.029; OR 11.143), OHS knowledge (P=0.290), use of PPE (P=0.003; OR=5.971). There is a significant relationship between length of work and use of PPE and the incidence of work accidents among fabrication workers in the steel structure workshop area. The conclusion is that there is a relationship between compliance with the use of PPE and length of work with work accidents, while the factors age, education, length of service, OHS knowledge have no relationship with the incidence of work accidents. Suggestions are to regulate employee working hours so that there is no overtime in work progress and to increase compliance with the use of PPE for fabrication workers in the steel structure workshop area of PT.

Corresponding Author:

Sukriyadi,
Magister Kesehatan Masyarakat,
Universitas Muhammadiyah Jakarta,
Jl. K.H. Ahmad Dahlan, Cireundeu, Kec. Ciputat Tim., Kota Tangerang Selatan, Banten 15419, Indonesia
Email: sukriyadiskm@gmail.com

INTRODUCTION

The development and progress of the industry is increasingly rapid and sophisticated in all products and services. There are many new challenges that grow in the process of development and business in the industrial world, one of which is work-related accidents (Adha, 2020)(Andriyani et al., 2023). The occurrence of accidents in the work process becomes a benchmark for the success of Occupational Safety and Health (K3) industry management in running its business processes. Every job certainly has risks and dangerous conditions that have the potential to cause accidents that can harm both material and life (Antoninda, 2024)(Malau,

2022). A work accident is defined as an unexpected, unwanted event that causes chaos in the process of activities or work, resulting in losses of both life and property (Law No. 01 of 1970) (Saraswati, 2022)(Arfah, 2025).

Work accidents are impacts caused by triggering factors that result in near misses which then become accidents.(Dahlan, 2018),(Dewi Kurniasih & KES, 2020). Accidents occur due to the relationship between the work being done or the result of interaction between workers and their tools and work environment. Generally, the occurrence of a work accident comes from unsafe behavior or actions (unsafe action) and unsafe conditions (unsafe condition) (Winarsunu, 2024)(Hutabarat, 2017).

There are losses caused by accidents, namely material losses (equipment damage) and losses of life (human) (Kaawoan, 2023)(Hamzah, 2018). Data from the ILO (International Labor Organization) 2018, shows that there are > 1.8 million fatalities/deaths due to work accidents occurring in the Asia and Pacific region where there are 374 million cases of injury/injury and work-related diseases per year that cause loss time injury (LTI). Meanwhile, based on data from the US BLS (United State of Labor Statistics) 2017, the largest fatality accidents occurred in the construction sector with 5,147 accident cases and 16% experienced death (Handari & Qolbi, 2021)(Wahyudi & Hakim, 2023).

Based on data from the United Nation Global Compact (UNGC) in 2021, it states that every year around 2.78 million workers experience work-related accidents that result in death and health problems or work-related diseases. This indicates that at least 7,500 people die from work-related accidents every day. Meanwhile, based on data from the WHO (World Health Organization) 2016, it is estimated that around 19% (360,000) deaths are due to work-related accidents.

In Indonesia, based on the 2022 BPJS (Social Security Administering Agency) report, there was an increase in the total death benefit claims by 30,094 cases in 2020 to 104,769 cases in 2021. Meanwhile, work accident claims increased from 221,740 in 2020 to 234,370 in 2021. Cases of work accidents increased by 11.12% in 2019 to 13.07% in 2020 (Octavia & Sudrajat, 2021)(Kahfi, 2022).

Every year the number of work-related accidents in Indonesia is increasing, throughout 2018 there was an increase compared to 2017. There were 123,041 cases of work-related accidents in 2017. While in 2018 there were 171,105 cases of work-related accidents (Monalisa, Subakir, & Listiawati, 2022)(Irkas, Fitri, Purbasari, & Pristya, 2020).

Banten Province is one of the provinces that has a large and varied number of industries, including fabrication, textile, petrochemical, power generation, gas & oil, shoes, food processing and others. The number of workers in each industry is also quite large and a risk or hazard in the workplace also has the potential to cause work-related accidents and health problems or occupational diseases (Balili & Yuamita, 2022)(Dewi & Ikhssani, 2021).

Based on data from the Ministry of Manpower of Banten Province in 2022, the number of work accident cases in 2022 was 5,980 cases and in 2021 it was 6,819 cases, this development seems to be decreasing, however at the beginning of 2023 the number of work accident cases had reached 400 cases, this is likely to increase (Astuti et al., 2023)(Suhandang, 2023).

Cilegon City is known as an industrial city where there are many large industries that produce both BUMN (State-Owned Enterprises) and private industries. Behind the number of large industries and the absorption of a lot of workers, there are quite a high number of accident cases in the production process. Data obtained in 2015 showed 325 cases of work accidents and 11 of them died (YULINDA, 2022)(WARIDIN, n.d.).

Generally, the cause of work accidents is caused by three factors, namely human factors (unsafe action) contributing around 80-85% of accidents caused by unsafe behavior, and the environment in the workplace (unsafe condition). Errors or negligence from Human factors (humans) for example age factors, length of service, education and knowledge (ISMAWATI, 2021),

In addition, in the 2014 ILO (International Labor Organization) research, it was stated that the factors causing work accidents consisted of age, length of service, knowledge, worker attitudes,

work shifts, behavior, education, gender, working hours, worker physical condition, K3 socialization, Standard Operating Procedures (SOP), safety training, K3 system management in the Company, supervision and work environment factors which include unsafe conditions, such as lighting, work climate, noise, ventilation, dust and so on.

One of the industries that has high risk and danger is the fabrication industry where there are work processes that have the potential to cause accidents. The steel structure fabrication industry processes include cutting process (cutting material), lifting process (handling), welding process (welding), assembly process (assemblying), finishing process (finishing), painting process (painting), packaging process (packing) and delivery (delivery).

Furthermore, the major potential hazards of these processes include fires due to hot work, such as welding, grinding, firing and so on. In addition, lifting materials using heavy equipment (cranes) according to capacity and lifting equipment also has the potential for workers to be crushed, trapped and fatal. Activities in the fabrication process include working at height which has an impact on fatalities due to falling from a height, the use of B3 (Hazardous and Toxic Materials) for painting which has an impact on fire, inhalation of toxic materials.

PT. X is a company engaged in steel fabrication for building construction, bridges, cranes and boiler package industries (pressure parts) which has been established since 1984. Referring to the steel standards used, PT. X uses iron-based materials imported directly from large steel companies both in Indonesia and abroad. PT. X is capable of producing 20,000 tons/year for Steel Structure and 5,000 tons/year for boiler packages and components. PT. X has a jetty area that is used as a place to mobilize products that are ready to be sent to clients by sea. The production results achieved up to thousands of tons per year are carried out by the Company to meet the needs of clients. PT. X has implemented a management system to ensure that all fabrication processes can be carried out to meet International Standards that require customers.

Based on a preliminary study through observation and accident data during the period of 2023, it was discovered that there were 14 cases of work accidents in the steel structure workshop production area at PT X. This is suspected to be due to unsafe behavior (unsafe action) and unsafe actions (unsafe condition) during the fabrication work process. In addition, violations of deviations from Occupational Safety and Health (K3) regulations often occur, such as not using a full body harness when working at heights, not using PPE (Personal Protective Equipment) according to the type of work, for example during welding, the process of lifting materials that exceed the lifting capacity of the heavy equipment used, so that this triggers work-related accidents and occupational diseases in fabrication workers.

Based on the description above and the results of preliminary observations, there is a risk and danger in the fabrication work process that has the potential to cause work-related accidents. Based on secondary data from the HSE department related to the 2023 HSE statistical report, there was an increase in work accidents compared to the previous year. Therefore, researchers are interested in conducting research on the determinants related to the occurrence of work accidents in fabrication workers in the steel structure workshop area at PT. X in 2024.

Based on the theoretical framework that has been described, the conceptual framework of the analysis of the determinants of work accidents in steel structure workshop production employees at PT. X in 2024 is as follows: research Hypothesis: (a) There is a relationship between age and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. (b) There is a relationship between education level and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. (c) There is a relationship between length of service and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. (d) There is a relationship between knowledge of K3 and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. € There is a relationship between length of service and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. (f) There is a relationship between

the use of PPE (Personal Protective Equipment) and the occurrence of work accidents in steel structure workshop production employees at PT X in 2024. (g) There are variables that have the most significant influence on the occurrence of work accidents in PT X in 2024.

RESEARCH METHOD

Types and Design of Research

This research design is quantitative analytical with a cross-sectional approach as a study that studies the relationship between dependent variables and independent variables by direct observation using questionnaires, collecting data that is assessed and measured simultaneously at one time (point time approach) or collected at the same time (Notoatmodjo, 2015). The independent variables are age, education level, length of service, length of service, knowledge of K3, supervision, use of PPE (Personal Protective Equipment) with the dependent variable being the incidence of work accidents in steel structure workshop production employees at PT X in 2024.

Place and Time of Research

The location of this research was conducted at the steel structure workshop of PT X in April - May 2024. Samples were taken from the fabrication production section, namely welders, fitters, firing and heavy equipment operators.

Population and Sample

The population in this study were 112 employees of the steel structure workshop production at PT X. The sample was taken from the production workers in the steel structure workshop. The sampling technique was by accidental sampling, because the section or department may fill in and there are no special criteria in the section. The sample size in this study was calculated using the two-proportion hypothesis test sample calculation using the Lemeshow formula (1997):

$$n = \frac{(Z_{1-\alpha/2}\sqrt{2P(1-P)} + Z_{1-\beta}\sqrt{P_1(1-P_1)+P_2(1-P_2)})^2}{(P_1-P_2)^2}$$

n = Minimum number of samples
Z 1-α/2 = standard value of normal distribution at confidence level 1-α; value α = 0.05; then Z 1-α/2 = 1.96
Z 1-β = standard value of normal distribution at test power 1-β; β value is 90%, then Z 1-β = 1.28
P1 = Proportion of cases in exposed/at-risk group
P2 = Proportion of cases in unexposed/at-risk group
P = P1 + P2

Based on the calculation of the Lemeshow formula sample, the results obtained were 58 respondents who had been added 10% as anticipation of missing data. The sample criteria are as follows:

Inclusion criteria

Steel structure workshop production employees of PT IHI Power Service Indonesia, namely assembly, welding, firing, finishing and handling as well as employees present during the research. The following is a sample calculation per section of the number of employees in the steel structure workshop production at PT IHI Power Service Indonesia:

Table 1. Number of samples per section

No.	Section	Number of employees	Calculation	Results
1	Assembly	51	51/112 x 58	26
2	Welding	48	48/112 x 58	25
3	Firing & finishing	7	7/112 x 58	4

No.	Section	Number of employees	Calculation	Results
4	Handling	6	6/112 x 58	3

Source: PT IHI Power Service Indonesia

From each section, questionnaires and interviews will be distributed according to the predetermined number.

Exclusion criteria

Steel structure workshop production employees of PT X who were unwilling to be respondents.

Data collection

In the data collection process, this research instrument uses a questionnaire. The data collected consists of primary data and secondary data, as follows: a) Primary Data, primary data is data obtained directly at the research location related to age, education level, length of service, length of service, knowledge of K3, knowledge of K3 and use of PPE (Personal Protective Equipment) with the occurrence of work accidents in the steel structure workshop production area of PT X; b) Secondary Data, secondary data is data obtained from company data related to work accidents, literature references, and the number of production employees at PT X.

The research was conducted by researchers directly in the field, namely in the steel structure workshop area of PT X. The questionnaire used was adopted from other people's research questionnaires (Anggia Nada, 2021).

RESULTS AND DISCUSSIONS

Univariate Analysis

The univariate analysis in this study includes the frequency distribution and percentage of each variable, namely age, length of service, level of education, length of service, knowledge of K3 and use of PPE (Personal Protective Equipment) with the occurrence of work accidents in fabrication workers in the steel structure workshop area of PT.X in 2024. The results obtained from 58 respondents were that 26 (44.8%) respondents had experienced a work accident and 32 (55.2%) respondents had never experienced a work accident. The results obtained from 58 respondents who were <31 years old were 14 (24.1%) respondents and those who were ≥31 years old were 44 (75.9%) respondents. The results obtained from 58 respondents who have low education (Elementary School - Senior High School/Vocational High School) are 56 (96.6%) respondents, while those who have higher education are 2 (3.4%) respondents. In detail, the results of 58 respondents who have elementary school education (SD) are 0 (0%) respondents, while those who have junior high school education or equivalent are 1 (1.7%) respondents and those who have high school/vocational high school education or equivalent are 55 (94.8%) and those who have undergraduate education (S1) are 2 (3.4%) respondents. In the grouping of education levels, two categories are made, namely low education (Elementary School - Senior High School) and higher education (college). The results obtained from 58 respondents who had a work period of > 5 years were 44 (75.9%) respondents and those who had a work period of ≤ 5 years were 14 (24.1%) respondents. obtained results from 58 respondents who experienced working hours ≤ 8 hours/day as many as 5 (8.6%) respondents and those who experienced working hours > 8 hours/day as many as 53 (91.4%) respondents. The basic rules governing normal and abnormal working hours are the Job Creation Law No. 06 of 2023, so that the standard for working hours is in accordance with applicable regulations. The results obtained from 58 respondents were 11 (19%) respondents who had poor knowledge of K3 and 47 (81%) respondents who had good knowledge. The results obtained from 58 respondents showed that 29 (50%) respondents had poor knowledge of K3 and 29 (50%) respondents had good knowledge.

Bivariate Analysis

Bivariate analysis was conducted on two variables that were suspected to be related or correlated (Notoatmodjo, 2010). Bivariate analysis was used to determine the relationship between dependent variables and independent variables. The dependent variable in this study was the occurrence of work accidents, while the independent variables in this study were the age of workers, the level of education of workers, length of service, length of service, knowledge of K3 and use of PPE (Personal Protective Equipment). The results of the statistical analysis test of the relationship between age and work accidents showed that respondents with a young age of ≤ 31 years were fewer who had experienced work accidents as many as 9 (64.3%) compared to respondents aged > 31 years who had experienced work accidents as many as 17 (38.6%) respondents. The results of the analysis using the chi square test obtained a P Value of 0.126 (P Value> 0.05) so that Ho was accepted, it can be concluded that statistically at α = 5% there is no significant relationship between age and the incidence of work accidents in fabrication workers in the steel structure workshop area of PT.X in 2024. The results of the statistical analysis test of the relationship between education level and work accidents showed that respondents with low education levels were more likely to have experienced work accidents as many as 25 (44.3%) compared to respondents with higher education who had experienced work accidents as many as 1 (50%) respondents. The results of the analysis using the chi square test obtained a p Value of 1,000 (p Value> 0.05) so that Ho was accepted, so it can be concluded that statistically at α = 5% there is no significant relationship between education level and the incidence of work accidents in fabrication workers in the steel structure workshop area of PT.X in 2024. The results of the statistical analysis test of the relationship between work period and work accidents show that respondents with a work period of >5 years have experienced more work accidents as many as 17 (38.6%) compared to respondents with a work period of ≤ 5 years who have experienced work accidents as many as 9 (64.3%) respondents. The results of the analysis using the chi square test obtained a p Value of 0.126 (p Value> 0.05) so that Ho is accepted, it can be concluded that statistically at α = 5% there is no significant relationship between work period and the occurrence of work accidents in fabrication workers in the steel structure workshop area production section at PT.X in 2024. The results of the statistical analysis test of the relationship between length of work and work accidents showed that respondents with a length of work ≤ 8 hours/day had fewer work accidents, as many as 4 (80%) compared to respondents with a length of work > 8 hours/day who had experienced work accidents as many as 14 (26.4%) respondents. The results of the analysis using the chi square test obtained a p Value of 0.029 (p Value <0.05) so that Ho was rejected, so it can be concluded that statistically at α = 5% there is a significant relationship between length of work and the occurrence of work accidents in fabrication workers in the steel structure workshop area production section at PT.X in 2024.

Based on the risk estimate calculation, OR = 11.143 (1.146-108.375) was obtained, meaning that respondents with working hours > 8 hours/day had 11.143 times greater risk of experiencing work accidents than respondents with working hours ≤ 8 hours/day. The results of the statistical analysis test of the relationship between length of service and work accidents showed that respondents with a lack of knowledge of K3 had fewer work accidents, as many as 5 (45.5%) compared to respondents with good knowledge of K3 who had experienced work accidents as many as 13 (27.7%) respondents. The results of the analysis using the chi square test obtained a p Value of 0.290 (p Value <0.05) so that Ho was accepted, so it can be concluded that statistically at α = 5% there is no significant relationship between length of service and the occurrence of work accidents in fabrication workers in the production section of the steel structure workshop area at PT.X in 2024. The results of the statistical analysis test of the relationship between the use of PPE and work accidents showed that respondents who did not fully use PPE were more likely to have experienced work accidents as many as 19 (65.5%) compared to respondents who fully used PPE who had experienced work accidents as many as 7 (24.1%) respondents. The results of the analysis

using the chi square test obtained a p Value of 0.003 (p Value <0.05) so that Ho was rejected, it can be concluded that statistically at α = 5% there is a significant relationship between the use of PPE and the occurrence of work accidents in fabrication workers in the production section of the steel structure workshop area at PT.X in 2024. Based on the risk estimate calculation, OR = 5.971 (1.352-5.450) was obtained, meaning that respondents who did not fully use PPE (Personal Protective Equipment) were 5.971 times more at risk of experiencing work accidents than respondents who fully used PPE.

Multivariate Analysis

In the multivariate analysis test, a method is used by connecting several independent variables that have the requirements to enter the multivariate test with the dependent variable at the same time. Multivariate analysis can determine the independent variables that have the most influence on the occurrence of a case in the study. Bivariate selection by selecting variables that have a p value <0.25 which are included in the model to carry out the logistic regression test.

Table 2. Bivariate candidate selection

Variables	p value	Information
Age	0.126	Not a candidate
Level of education	1,000	Not a candidate
Length of working	0.029	Candidate
Years of service	0.126	Not a candidate
K3 Knowledge	0.290	Not a candidate
Use of PPE	0.003	Candidate

In the logistic regression modeling process, there are results that do not show any variables that have a large influence on work accidents, in addition, the multivariate test requirements have been carried out according to the requirements, but there are no results from the two variables that have a large influence on the occurrence of work accidents. Work accidents are unexpected, unwanted events that cause losses to materials (property, equipment, costs) or lives (life, death, disability, injury) or even work processes that are hampered, resulting in losses in the production process (Suma'mur, 2009). In a study of fabrication workers at PT.X related to work accidents, results were obtained from 58 respondents, where 26 (44.8%) respondents had experienced work accidents and 32 (55.2%) respondents had never experienced work accidents. This is in line with research by Widyanti, Pertiwi (2021) where respondents who experienced work accidents were fewer, namely 57 (44.2%) respondents from 129 respondent samples.

Based on the results of data processing on work accident incident variables, the types of incidents that have been experienced are being trapped (19.3%), being hit by material (6.4%) and being cut (5.3%). Several near-miss incidents and unsafe conditions became points of observation for researchers in the PT.X steel structure workshop area.

Based on field observations, the work accidents experienced by respondents were the result of unsafe actions and unsafe conditions that caused work accidents. For example, when lifting materials, they did not avoid the line of fire (danger zone), did not use tag lines as lifting aids, did not use gloves during the lifting process. In addition, in the fabrication process, based on observations, workers in the steel structure workshop area were very indifferent to work safety regulations, such as the use of PPE (Personal Protective Equipment) according to their work.

Based on information from Nurcahyo Irawan (HSE Manager PT X), he said that the number of work accidents increased due to unsafe worker behavior (unsafe action) and most of those who experienced work accidents were in the material handling process, where the process of placing, lifting, turning over large-capacity materials using heavy equipment and potentially being pinched, crushed, cut and so on. HSE statistical data for the period January - May 2024, showed that the level of work accidents increased with the majority being pinched, crushed, cut in fabrication workers (HSE Report, 2024). Based on the factors causing work accidents in the steel

structure workshop area are unsafe actions, such as lack of compliance in the use of PPE (Personal Protective Equipment), each worker has working hours that exceed the standard normal working hours so that it causes fatigue and risks causing work accidents. There needs to be an evaluation of a comprehensive work safety management system, in order to find the root cause to obtain policies in preventing work accidents.

Age is a person's age calculated from birth to their birthday in calendar calculations (Lasut, 2017). Based on a study of fabrication workers in the steel structure workshop area of PT.X in 2024, the results were obtained from 58 respondents who were <31 years old as many as 14 (24.1%) respondents and those who were ≥ 31 years old as many as 44 (75.9%) respondents. At the age of <31 years, 9 (64.3%) had experienced work accidents and 5 (35.7%) had never experienced work accidents. This shows that those aged <31 years have a tendency to have work accidents, while in the age group ≥ 31 years, 17 (38.6%) had experienced work accidents and 27 (61.4%) had never experienced work accidents. In the analysis, the age factor influences workers experiencing work accidents, if the age is more mature, then the ability to think, work skills and compliance with safety rules also increase, this triggers the influence of work accidents, so that the OR value = 2.859 is obtained which means that young people have a risk 2 times greater of work accidents.

Based on the results of the study, it can be described that workers at PT X are mostly workers aged ≥ 31 years, amounting to 75.9%, meaning that most of the production workers are on average adults and have experience and skills in their respective fields of work. The results of the study showed that the youngest worker was 21 years old and the oldest was 54 years old. Young workers are more likely to have work accidents than older or adult workers. This is because at a young age, unsafe actions are often carried out, such as lack of discipline, carelessness, haste, a tendency to follow one's heart and lack of attention (Oborne, 1982).

Based on field observations, it is known that almost all fabrication workers are workers who are over 30 years old or can be said to be seniors, this is because these workers have an average working period of 15-25 years in working. In line with Hurlock's research in (Batbual, 2021) that the age of workers who have a level of maturity and strength will be able to work professionally, obey the rules and discipline and mature in thinking to work, so that the risk in making decisions is usually right. Based on data from the HSE Department of PT.X 2023, it is known that the number of work accidents based on age factors is known to be an average of 30 years and over. This is due to the many factors of work accidents in unsafe conditions plus the behavior of senior workers who only prioritize production progress but ignore work safety factors.

Education is an effort to develop one's potential in a planned manner in order to obtain spiritual strength, intelligence, noble morals, skills, both for individuals and the nation and state (Law No. 20 of 2003). Based on the research results, the education level of fabrication workers was 58 respondents, none of whom had an elementary school education, while workers with junior high school/equivalent education were 1 (1.7%) respondents, workers with high school/equivalent education were 56 (96.6%) respondents and workers with a bachelor's degree (bachelor's degree) were 2 (3.4%) respondents.

In the categorization of education level consists of low education (elementary school to high school/vocational high school equivalent) and higher education (college). The results obtained that out of 58 respondents, 56 respondents who had low education, there were 25 (44.6%) respondents who had experienced work accidents and 31 (55.4%) had never experienced work accidents. while in workers who had higher education there were 2 respondents and there was 1 respondent who had experienced work accidents and 1 other respondent had never experienced work accidents. Based on direct observation in the steel structure workshop, it is known that almost all employees are high school/vocational high school graduates and work in various types of jobs, such as welders, fitters, operators, machining, cutting and so on.

The period of employment is the time span of workers from the beginning of the employment contract until the time the research takes place. Usually the period of employment is

an agreement between workers and the company to start and become worker status. The period of employment is determined by the period of work such as old employees or new employees.

Based on the results of the study on the variable of length of service, the results obtained from 58 respondents were workers with a length of service > 5 years as many as 44 (75.9%) respondents and ≤ 5 years 14 (24.1%) respondents. This can be seen that fabrication workers have a long period of service at Company PT X so that these workers are capable of work skills, know the risks of work hazards, are familiar with work rules and comply with work discipline. In the observation at the research site, it was found that almost most of the employees have a fairly long working period, because in 2010 there was a mass recruitment of permanent employees, so that if calculated the working period is approximately 15 years. In the working period, some employees have an average age of 40 years and above, so that a risk of incidents occurs due to factors of workers who do not yet have awareness of work safety. According to Handoko (2002), work time is defined as the duration of work time for workers in a day. Each worker has a different work time, but generally it is 8 hours of work per day (Law No. 13 of 2003). If there are workers who have a work time of more than 8 hours, it is called overtime. The regulation of overtime hours is according to company policy. Based on the results of the study on the variable of length of work, the results obtained from 58 respondents were workers who had working hours ≤ 8 hours/day as many as 5 (8.6%) respondents while workers who had working hours > 8 hours/day were 53 (91.4%) respondents. This shows that most of the PT X fabrication workers have working hours outside the normal or more than 8 hours, so they have the potential risk of work accidents.

In field observations in the steel structure workshop area, it is known that the working hours of workers start (Monday - Friday) from 06.00 - 18.00 WIB, while Saturday and Sunday (07.30 - 16.00 WIB). The addition of normal working hours (overtime) for workers and subcontractors occurs in all areas. This has become a habit in the production process of PT X. According to Mubarak (2011), defining knowledge as something known by an individual based on his/her experience, skills and knowledge will increase along with the experience process that occurs in the individual. Knowledge is not only related to theory but a technicality in work also affects individuals in the work process towards aspects of occupational safety and health (K3).

Based on the results of the study on the variable of K3 knowledge in the fabrication workers of the steel structure workshop area of PT X, it was obtained from 58 respondents who had poor knowledge of 11 (19%) respondents and those who had good knowledge of 47 (81%) respondents. The results of the study can be described that most of the fabrication workers of the steel structure workshop area have good knowledge. It can be assumed through this knowledge variable that workers are able to know the prevention of hazardous conditions that cause work accidents during the work process. Knowledge is one of the important factors for individuals in providing motivation to act. A person's behavior based on good knowledge will last longer than a person's behavior with less knowledge. Low worker knowledge means having less insight and understanding, so that there is a risk of work processes that cause work accidents (Green, Notoatmodjo 2010).

According to Tarwaka (2016), inadequate knowledge of K3 can lead to unsafe actions or unsafe actions by workers which can result in work accidents. According to Roughton 2002, the use of PPE (Personal Protective Equipment) is defined as a continuation of actions in efforts to prevent work accidents when other control hierarchies are not effective in their application. The use of PPE (Personal Protective Equipment) for PT X fabrication workers is mandatory based on the provisions of Law No. 01 of 1970 or work safety procedures in the aspect of PPE use so that every worker is required to use it according to the type and risk of work during the work process. In the research observation, the use of PPE is divided into two, namely the completeness of the use of PPE and the incompleteness of workers using PPE according to their respective jobs.

Based on the results of the study on the variable of PPE use in fabrication workers in the Steel Structure workshop area of PT X, the results obtained from 58 respondents were that 29 (50%)

respondents did not use complete PPE and 29 (50%) respondents used complete PPE. In the researcher's observation, it was found that the use of PPE in actual fabrication workers was not complete according to their work, this was based on direct observation of the individual objects studied, some workers did not use gloves, masks or glasses even though in the questionnaire the workers claimed to be complete. This is a discrepancy between the recognition of workers in actual work and the data collection from the questionnaire in this study. The PPE (Personal Protective Equipment) provided by the company is very complete, however, the concern of fabrication workers in the work process is not all PPE is used completely by the workers, which poses a high risk of work accidents.

Based on information from Nurcahyo Irawan (HSE Manager, 2024) that the behavior of PT X fabrication workers in the use of PPE (Personal Protective Equipment) is still less concerned about the completeness of the PPE that must be worn, this can be seen from several fabrication workers such as welders not using special welder respiratory masks, workers at heights do not use full body harnesses, fitter workers do not use ear plugs, so that several notes of worker findings every day always find the same thing regarding the use of PPE, the main trigger is the lack of worker concern in using PPE even though PPE equipment has been provided by the Company free of charge. This is what causes the potential for work accidents for PT X fabrication workers.

CONCLUSION

Based on the results of the study, data analysis and discussion conducted on 58 respondents or workers in the steel structure workshop area of PT X in 2024, the following conclusions can be drawn: Respondents who have experienced work accidents are 26 (44.8%). Respondents who are <31 years old are 14 (24.1%), Respondents who have low education are 561 (96.2%), Respondents who have a work period of> 5 years are 44 (74.9%). Respondents who have a working period of> 8 hours per day are 53 (91.4%). Respondents who have poor knowledge are 11 (19%). Respondents who use incomplete PPE while working are 29 (50%). There is no relationship between age and the occurrence of work accidents in the steel structure workshop area of PT X with a P Value of 0.126, There is no relationship between education level and the occurrence of work accidents in the steel structure workshop area of PT X with a P Value of 1,000, There is no relationship between length of service and the occurrence of work accidents in the steel structure workshop area of PT X with a P Value of 0.126, There is a relationship between length of service and the occurrence of work accidents in the steel structure workshop area of PT X with a P Value of 0.029, There is no relationship between knowledge of K3 and the occurrence of work accidents in the steel structure workshop area of PT X with a P Value of 0.290, There is a relationship between the use of PPE and the occurrence of work accidents in the steel structure workshop area of PT X with a p Value of 0.003. Suggestions for Companies, There needs to be a company policy in setting working hours in order to reduce the risk of work fatigue which results in potential work accidents, Increase worker awareness and commitment to work safety with the use of complete PPE, Implement K3 training for all employees to increase awareness of work and prevent work accidents. For Workers, Conduct counseling to supervisors or Safety officers to provide suggestions or complaints regarding unsafe conditions Increase awareness of the use of complete PPE and comply with work safety regulations. Hold a TBM (Tool Box Meeting) before starting work by refreshing aspects of work safety and praying before working. For Researchers, For further researchers, observations should be made to determine research variables on work accidents that are not included in the variables of this study.

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