
Analysis Of Potential Hazards And Use Of Personal Protection Equipment (Ppe) On Oil Palm Processing And Production Workers In PKS XYZ

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Abstract

Every workplace has a risk of work accidents. Potential hazards and risks in the workplace can occur due to work systems or work processes that are not in accordance with procedures, the use of machines, tools and materials that are not careful, the behavior of workers, as well as the work environment itself which will have an impact on reducing the effectiveness of workers. The purpose of this study was to determine the potential hazards and use of personal protective equipment (PPE) in PKS XYZ. This research uses a descriptive qualitative research type. The research informants were determined using purposive sampling, totaling 13 informants consisting of 3 key informants, 7 main informants and 3 supporting informants. Data collection techniques were carried out by in-depth interviews, observation, and documentation. Test the validity of the data using triangulation techniques. The research results obtained in the palm oil processing and production section at PKS XYZ contained 51 potential hazards spread over 7 work stations which were classified into 5 sources of danger including mechanical hazards, physical hazards, chemical hazards, electrical hazards, and ergonomic hazards. So it is necessary to have support from the company to implement an Occupational Safety and Health management system in factories and require workers to use personal protective equipment while working.

Keywords: Hazard Potential, Hazard Identification, PPE

INTRODUCTION

Occupational safety for companies has an important role for workers apart from the impact related to accidents but the losses incurred both directly and indirectly to employees and companies are also large (Qurbani & Selviyana, 2018). Every workplace has a risk of work accidents. Potential hazards and risks in the workplace can occur due to work systems or work processes that are not in accordance with procedures, the use of machines, tools and materials that are not careful, the behavior of workers, as well as the work environment itself which will have an impact on reducing the effectiveness of workers (Ramli, 2014).

According to 2018 International Labor Organization data, there are 1.8 million work-related deaths each year in the Asia and Pacific region. At the global level, more than 2.78 million people die each year as a result of work accidents (Darwis et al., 2020). In Indonesia, based on the Workers' Social Security Agency, there were work accident cases in 2017 with a total of 123,041 cases, and there was an increase in 2018 with a total of 173,105 work accident cases. And in 2019 there were 114,000 work accident cases, increasing again in 2020 in January-October with a total of 177,000 work accident cases (Handari, Siti RiptifahTri; Qolbi, 2019) (Newstrend, 2021).

Research conducted by Supriyadi and Fauzi Ramdan stated that there were 12 (24.5%) mechanical hazards, 5 (10.2%) electrical hazards, 3 (6.1%) chemical hazards, and 29 (59.2%) potential physical hazard (Supriyadi & Ramdan, 2017). This research is in accordance with the domino theory developed by H.W Heinrich (1931) which states that work accidents are caused by 88% of unsafe acts, 10% of unsafe conditions and 2% of "acts of God" or those that cannot be avoided (Salami & I.R.S, 2016).

Research conducted by Willy Tambunan (2019) states that there are potential physical hazards, mechanical hazards, and environmental hazards such as falls, minor injuries, slips, scratches, being

crushed by materials, muscle disorders, low back pain due to wrong work positions. On environmental hazards in the form of hearing loss due to grinding noise (Tambunan et al., 2019).

Work accidents can be prevented by increasing the degree of occupational safety and health (K3) related to activity guarantees and a safe and comfortable work environment (Putra, 2018). Work accidents can be avoided by knowing and recognizing the potential hazards that exist in the work environment (Urrohmah, 2019). One effort that can help is by identifying hazards and risk assessments so that effective control efforts can be made to increase work productivity and reduce work accidents.

Knowing what hazards occur in the work environment, we can implement hazard control efforts to minimize potential hazards until the risks are accepted by workers. One of them is the use of personal protective equipment which is an effort to control hazards at the last stage where to reduce or minimize workers' exposure to hazards in the work environment such as gloves, helmets, eye and leg protection, hearing protection equipment and protective clothing.

Based on the initial data survey conducted at PKS XYZ, it was found that there are several potential hazards in the processing and production of palm oil, including mechanical hazards, physical hazards, electrical hazards, chemical hazards, and ergonomic hazards. Potential hazards at PKS XYZ include slippery floors, falling heavy objects, being pinched and scratched on the machine, exposed to steam, pipes and hot oil, electrical short circuits, exposure to noise, and exposed to sparks from combustion at the boiler station. The company already has an OSH program, but the implementation is not going well and there is no concern for the safety of employees in this company, for the production process.

The purpose of the research conducted was to determine the process of occurrence of potential hazards and the use of personal protective equipment (PPE) for workers in the processing and production of palm oil in PKS XYZ.

RESEARCH METHODS

This study uses a type of qualitative research with a descriptive design. Qualitative research is research to see a description of the phenomena that occur in a certain population based on the facts that occur. Research informants were determined using purposive sampling, totaling 13 informants including, 3 key informants (Foreman of Processing Shift I, Foreman of Processing of Shift 2, and Foreman of Engineering), 7 supporting informants (Operator Stew, Operator Bunch Press, Operator Pressan, Clarification Operator, Operator Kernel, Machine Room Operator, and Boiler Operator), as well as 3 supporting informants (1 Assistant Bunch Press Station Mechanic, 1 Pressing Station Mechanical Assistant, and 1 Kernel Station Mechanical Assistant). Data collection techniques were carried out by in-depth interviews, observation, and documentation. Test the validity of the data using triangulation techniques.

RESULTS AND DISCUSSION

Results

PKS XYZ is a company engaged in the processing of Palm Oil into Crude Palm Oil (CPO) and produces palm kernel. The XYZ palm oil mill has a processing capacity of 30 tons/hour. As well as those who use Vertical Sterillizer boiling technology. PKS XYZ has not implemented the OHS management system properly, as evidenced by the discovery of OHS problems at the factory such as the absence of an OHS hazard sign at each station, an APAR that has no contents, and a lack of supervision from above regarding the use of personal protective equipment (PPE).



Figure 1. Interview with informants

Guidelines for Occupational Safety and Health Management Systems at PKS XYZ, namely according to PP No. 50 of 2012. The process flow of processing FFB into CPO and palm kernel at PKS XYZ can be seen in picture 1 below.

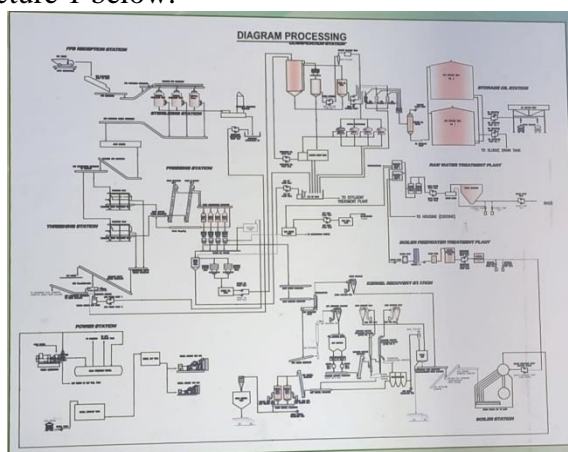









Figure 1. Diagram Processing and Production Palm Oil
 source: Primary Data

After collecting and processing data on findings of hazards that could occur or have the potential for work accidents in the PKS palm oil processing and production section. PKS XYZ then the next step is to analyze the source of the hazard. The findings of the potential hazards that exist in PKS XYZ can be seen in table 1 below:

Table 1. Hazard Identification

Work Process	Potential Hazard	Hazard Type
Sterillizer Station		
Boiling Fresh Fruit Bunches 	Slipped on the floor and slippery stairs	Mechanical hazard
	The fall of heavy objects such as bolts	Mechanical hazard
	Workers may be exposed to oil and hot water.	Physical hazard
	Sprayed with hot steam (steam)	Physical hazard
	Inhale the steam from the stew	Chemical hazard
	Electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
Bunch Press Station		
Processing empty fruit bunches to take oil	Slipped on the floor and slippery stairs	Mechanical hazard
	Pinched, scratched and injured in the machine	Mechanical hazard
	Hit the pipe that is transverse	Mechanical hazard

	Sprayed with hot steam (steam)	Physical hazard
	Exposed to hot engine	Physical hazard
	Exposed to oxygen splash	Chemical hazard
	Inhalation of hot steam resulting from the processing of chopped empty bunches	Chemical hazard
	electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
	Press-an station	
Processing ripe palm fruit for pressing with the aim of extracting oil from the palm fruit. 	Slipped on the floor and slippery stairs	Mechanical hazard
	Pinched and injured in the machine	Mechanical hazard
	Scratched on the machine	Mechanical hazard
	Sprayed with hot steam (steam) and hot water	Physical hazard
	Exposed to hot pipes	Physical hazard
	Got splashed with oil due to a leaky cut press.	Physical hazard
	Inhale hot steam resulting from pressure	Chemical hazard
	Electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
	Clarification Station	
Processing and refining crude oil. 	Slipped on the floor and slippery stairs	Mechanical hazard
	Exposed to hot pipes	Physical hazard
	Exposed to hot oil	Physical hazard
	Exposed to hot steam	Physical hazard
	Inhalation of hot steam	Chemical hazard
	Electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
Kernel Station		
To separate the seeds, fiber and shells and process them into palm kernel. 	Slipped on the floor and slippery stairs	Mechanical hazard
	Stuck in the machine	Mechanical hazard
	Exposure to noise from turbine engines and polishing drums	Physical hazard
	Inhalation of dust from kernel and boiler	Chemical hazard
	Electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
Boiler station		
Doing combustion to produce hot steam.	Squeezed and scratched on the crank bar	Mechanical hazard
	Exposed to sparks and embers	Physical hazard
	Exposed to hot tools and machines	Physical hazard
	Inhalation of fiber dust	Chemical hazard

	Electrical short	Electrical hazard
	Unergonomic working position	Ergonomics hazard
Power House Station		
	To channel hot steam using a turbine or generator to the station that needs it.	Slipped on the floor and slippery stairs
		stuck in the machine
		Exposure to noise from turbine engines and generators
		Exposed to hot pipes
		Inhaled boiler dust
		Inhalation of hot steam
		Electrical short
		Mechanical hazard
		Mechanical hazard
		Physical hazard
		Physical hazard
		Chemical hazard
		Chemical hazard
		Electrical hazard

Discussion

1. Boiling Station

Based on the observations, there are 7 potential hazards at the boiling station, such as slipping on floors and slippery stairs, falling heavy objects such as bolts, being exposed to oil and hot water, inhaling boiled steam, electrical short circuits, and slouching work attitudes. So that the risks arising from these potential hazards are workers experiencing injuries, respiratory problems, and burns.

Research conducted by Afnella & Utami (2021) regarding the analysis of the risk of work accidents at PT. X there is a potential hazard of electric shock, being caught in the boiling door, being sprayed by hot steam, slipping/falling, and being exposed to hot FFB (Afnella & Utami, 2021). In line with research conducted by Sitepu & Simanungkalit (2020) regarding hazard identification, risk assessment, and risk control, there are potential hazards of being sprayed with hot steam, being hit by heavy objects, electrocuted, and slipping at the boiling station (Sitepu & Simanungkalit, 2020).

The results of research by Sirmon, et al (2013) regarding the analysis of the level of application of the K3 program said that there is a potential hazard at the sterilizer station, namely slipping caused by water spilled in the boiling process and containing oil (Tarigan et al., 2013).

2. Bunch Press Station

Based on the results of observations there are 9 potential hazards at the bunch press station such as slipping on the floor, being pinched and scratched by the machine, hitting the pipe, being sprayed by hot steam, being exposed to hot engines, being exposed to splashes of oxygen, inhaling hot steam, electrical short circuits, and bad working attitudes. bow. So that the risks arising from these potential hazards workers experience injuries, respiratory problems, and burns (scalded).

In using personal protective equipment (PPE), workers are only given helmets from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets, boots and masks when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

3. Press-an station

Based on the results of observations there are 9 potential hazards at the pressure station such as slipping on slippery floors and stairs, being pinched and injured in the machine, being scratched on the machine, being sprayed by hot steam, being exposed to hot pipes, being exposed to oil splashes, inhaling hot steam, electrical short circuits, and long sitting posture. So that the risks arising from these potential hazards workers experience injuries, respiratory problems, and burns (scalded).

Research conducted by Ori Saputra & Gaustama Putra (2022) regarding the analysis of potential hazards in the palm oil production area of PT. Beurata Subur Persada said that there was a potential hazard in the press area, namely falling from the stairs due to going up and down to the top of the press, and slipping on the press floor (Saputra & Putra, 2022). In line with the research conducted by Muhammad Nur (2021) regarding the analysis of the level of occupational health and safety (K3) risk at PT. XYZ said that there are several potential hazards at the press station, namely hitting the head on the oil pipeline, slipping/falling, inhaling dust, exposure to odors/vapours, exposure to noise, and being sprayed by hot steam (Nur, 2021).

In using personal protective equipment (PPE), workers are only given helmets from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets, boots and masks when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

4. Clarification station

Based on the observations, there are 7 potential hazards at the clarification station, such as slipping on slippery floors and stairs, being hit by hot pipes, being exposed to hot oil, being exposed to hot steam, inhaling hot steam, electrical short circuits, and slouching work attitudes. So that the risks arising from these potential hazards workers experience injuries, respiratory problems, and burns (scalded).

Research conducted by Abdul Azis Syarif, et al (2022) regarding the analysis of worker safety risks in the production department at PT. Green Gem Palm Oleo Kim II Kab. Deli Serdang said that based on an analysis of the sources and potential hazards, there were several potential hazards at the clarification station, including falling or slipping, and when operating the machine could be electrocuted (Syarif et al., 2022). In line with research conducted by Afnella & Utami Research (2021) regarding the HIRA method of work accident risk analysis at PT. X said that there are potential hazards at the clarification station, such as slipping on slippery stairs, hot oil splashing, electric shock, and getting stuck in the V-Belt chain coupling (Afnella & Utami, 2021).

In using personal protective equipment (PPE), workers are only given helmets from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets, boots and gloves when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

5. Kernel Station

Based on the results of observations there are 6 potential hazards at the kernel station such as slipping on floors and slippery stairs, getting stuck in machines, exposure to noise, inhalation of dust, electrical short circuits, and slouching work attitudes. So that the risks arising from these potential hazards are workers experiencing injuries, respiratory problems, hearing problems, and burns (scalded).

Research conducted by Abdul Azis Syarif., et al (2022) regarding the analysis of worker safety risks in the production department at PT. Green Gem Palm Oleo Kim II Kab. Deli Serdang said that there were potential hazards at the kernel station, including slipping on the stairs while carrying out surveillance, while operating machines could pose a hazard such as being stuck in a conveyor section, and electrocution (Syarif et al., 2022). In line with research conducted by Muhammad Zulfi Ikhsan (2022) regarding hazard identification, risk of work accidents and proposed improvements using the JSA method at PT. Tamora Agro Lestari said that there are potential hazards that can occur at the kernel station such as cleaning polishing drums of fiber that can be affected by machine rotation, checking the ripeness of fruit seeds that can be exposed to machine noise, and cleaning the working environment from shells or palm kernels, the potential danger is that the head can hit machine parts (Ikhsan, 2022).

In using personal protective equipment (PPE), workers are only given helmets from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets and boots when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

6. Boiler station

Based on the results of observations there are 6 potential hazards at the boiler station such as being pinched and scratched on the crank bars, exposed to sparks and embers, exposed to hot tools and machines, inhalation of dust, work short circuits, and slouching work attitudes. So that the risks arising from these potential hazards workers experience injuries, respiratory problems, and burns (scalded).

Muhammad Zulfi Ikhsan's research (2022) regarding hazard identification, risk of work accidents and proposed improvements using the JSA method said that there are potential hazards at the boiler station, namely inhaling fiber, falling from heights, getting sparks, and being exposed to hot engines (Ikhsan, 2022). In line with the research conducted by Zeinda & Hidayat (2016) regarding the risk assessment of work accidents in boiler operations, there are potential hazards of noise, sparks, water vapor leaks, collisions, contact with hot steam pipes, electric currents, pinched hands, and falls and slips from height (Zeinda & Hidayat, 2016).

Research conducted by Supriyadi and Fauzi Ramdan (2017) related to hazard identification stated that mechanical hazards at the boiler station were being squeezed in the hopper area, falling from a height in the bunker area, experiencing hearing loss from sound or noise in the steam line area, and the occurrence of fire or explosion in furnace area and steam drum area (Supriyadi & Ramdan, 2017).

In using personal protective equipment (PPE), workers are only given helmets and leather gloves from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets, boots and gloves when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

7. Power House Station

Based on the results of observations, there are 7 potential hazards in the engine room station such as slipping on a slippery floor, getting stuck in the machine, being exposed to noise, being exposed to hot pipes, inhaling dust and hot steam, and electrical short circuits. So that the risks arising from these potential hazards are workers experiencing injuries, hearing loss, respiratory problems, and burns (scalded).

Research conducted by Muhammad Zulfi Ikhsan (2022) regarding hazard identification, risk of work accidents and proposed improvements using the JSA method said that there are hazards in the engine room station, including when monitoring steam stability. power such as steam engines, fans, generators that produce loud noises (Ikhsan, 2022).

In using personal protective equipment (PPE), workers are only given helmets and leather gloves from the company while for other personal protective equipment workers are responsible for purchasing them. Workers at this station only use helmets, boots and gloves when working. This is one of the reasons why workers lack the discipline to always use personal protective equipment when working.

There are 51 potential hazards found in the processing and production of palm oil which are classified into 5 types of hazard sources including: physical hazards, ergonomic hazards, chemical hazards, electrical hazards, and mechanical hazards including:

- 1) Mechanical hazards, namely slipping on stairs and slippery floors, falling heavy objects, being pinched and injured in the machine, colliding with pipes that cross the work area, and getting caught in the hoe bar.

- 2) Physical hazards, namely exposure to hot steam, hot oil, hot water, and hot pipes, as well as exposure to noise.
- 3) Chemical hazards, namely inhalation of hot steam, hot oil steam, fiber dust, combustion ash at the boiler station, and exposure to oxygen splashes.
- 4) Electrical hazards, namely electric short circuit
- 5) Ergonomics hazards, namely unnatural work postures.

Based on the SOP for the use of personal protective equipment (PPE), workers are required to use boots, helmets, gloves, masks, ear plugs, and heat-resistant gloves in accordance with the potential hazards at each station. This is in accordance with the provisions of the Work Safety Act No. 1 of 1970 article 14 C which states that employers must be obliged to provide safety equipment free of charge according to the nature of the hazard so that the selection of personal protective equipment must be done carefully by considering the type of hazard and treated as a last resort (Indonesia, 1970).

Control efforts are being made to prevent the occurrence of these potential hazards, namely using personal protective equipment according to standards such as helmets, safety shoes, gloves, protective clothing, masks, and ear plugs. Carry out regular maintenance on tools and machines, carry out cleaning in the work area, provide safety covers on machines, carry out periodic electrical checks, install warning signs and prohibitions, carry out worker health checks every 6 months, and carry out work in accordance with SOP (standard operating procedure).

CONCLUSION

Based on the identification of hazards at each station in the processing and production of palm oil in Aur Gading PKS, there are 51 potential hazards, including the stew station there are 7 potential hazards, 9 bunchpress stations have 9 potential hazards, Pressan station has 9 potential hazards, clarification station has 7 potential hazards, the kernel station has 6 potential hazards, the engine room station has 7 potential hazards, and the boiler station has 6 potential hazards. So there needs to be support from the company to implement an Occupational Health and Safety management system in factories and require workers to use personal protective equipment when working.

REFERENCES

- Afnella, W., & Utami, T. N. (2021). Analisis Risiko Kecelakaan Kerja Metode HIRA (Hazard Identification and Risk Assessment) di PT. X. *Jurnal Kesehatan Masyarakat*, 5(2), 1004–1012.
- Albar, M. E., Parinduri, L., & Sibuea, S. R. (2022). Analisis Potensi Kecelakaan Menggunakan Metode Hazard Identification and Risk Assessment (HIRA). *Buletin Utama Teknik*, 17(3), 241–245.
- Darwis, A. M., Novi poniharwani, Latief, A. W. L., Ramadhani, M., & Nirwana, A. (2020). Kejadian Kecelakaan Kerja di Industri Percetakan Kota Makassar. *Jurnal Kesehatan Masyarakat Maritim*, 3(2), 155–163.
- Handari, Siti RiptifahTri; Qolbi, M. S. (2019). Faktor-Faktor Kejadian Kecelakaan Kerja pada Pekerja. 556, 90–98.
- Ikhsan, M. Z. (2022). Identifikasi Bahaya, Risiko Kecelakaan Kerja Dan Usulan Perbaikan Menggunakan Metode Job Safety Analysis (JSA). *Jurnal Teknologi Dan Manajemen Industri Terapan*, 1(I), 42–52. <https://doi.org/10.55826/tmit.v1i1.13>
- Indonesia, P. R. (1970). Undang-Undang Nomor 1 Tahun 1970 tentang Keselamatan Kerja. 5.
- Newstrend, K. (2021). Kliping, 13 Januari 2021.
- Nur, M. (2021). Analisis Tingkat Risiko Kesehatan dan Keselamatan Kerja (K3) dengan

- Menggunakan Metode HIRARC di PT. XYZ. *Jurnal Teknik Industri Terintegrasi*, 4(1), 15–20.
- Putra, I. O. (2018). Risk Management at Biopharmaceutical and Pharmaceutical Analysis Laboratory of Airlangga University. *The Indonesian Journal of Occupational Safety and Health*, 7(1), 81–90. <https://doi.org/10.20473/ijosh.v7i1>
- Qurbani, D., & Selviyana, U. (2018). Pengaruh keselamatan & kesehatan kerja (k3) terhadap kinerja karyawan pada pt. trakindo utama cabang bsd. 1(1), 110–129.
- Ramli, S. (2014). *Sistem Manajemen Keselamatan & Kesehatan Kerja OHSAS 18001* (H. Djajaningrat (ed.); edisi.1). Dian Rakyat.
- Salami, D., & I.R.S. (2016). *Kesehatan dan Keselamatan Lingkungan Kerja*. Gadjah Mada University Press.
- Saputra, O., & Putra, G. (2022). Analisis Potensi Bahaya di Area Produksi Kelapa Sawit Menggunakan Metode HIRARC di PT. Beurata Subur Persada. VII(2), 2913–2921.
- Sitepu, Y. R. B., & Simanungkalit, J. N. (2020). Identifikasi Bahaya, Penilaian Risiko, dan Pengendalian Risiko Menggunakan Analisis Metode HIRARC. *Jurnal Penelitian Perawat Profesional*, 2(4), 495–504.
- Supriyadi, & Ramdan, F. (2017). Hazard Identification and Risk Assessment in Boiler Division Boiler Menggunakan Metode Hazard Identification Risk Assessment and Risk Control (HIRARC) Universitas Serang Raya. *Journal of Industrial Hygiene and Occupational Health*, 1(2), 161–178. <https://doi.org/10.21111/jihoh.v1i2.892>
- Syarif, A. A., Pulungan, M., & Siregar, M. Z. (2022). Analisis Resiko Keselamatan Pekerja pada Bagian Produksi di PT. PERMATA HIJAU PALM OLEO KIM II KAB. DELI SERDANG. X(1), 39–45.
- Tambunan, W., Zudhari, F. I., & Prawita, T. A. (2019). JIME (Journal of Industrial and Manufacture Engineering) Analisis Risiko Keselamatan dan Kesehatan Kerja Menggunakan Metode Hirarc pada Proses Perbaikan Kapal Tugboat (Studi Kasus PT Marga Surya Shipindo , Samarinda). 2(2), 33–41.
- Tarigan, S. P., Tambunan, M. M., & Buchari. (2013). Analisis Tingkat Penerapan Program Keselamatan Kesehatan Kerja (K3) dengan Pendekatan SMK3 dan Risk Assessment di PT. “XYZ.” 3(5), 8–16.
- Urrohmah, D. S. (2019). Identifikasi Bahaya dengan Metode Hazard Identification , Risk Assessment and Risk Control (HIRARC) dalam Upaya Memperkecil Risiko Kecelakaan Kerja di PT . PAL INDONESIA. 08(01), 34–40.
- Zeinda, E. M., & Hidayat, S. (2016). Pengoperasian Boiler di PT. Indonesia Power Unit Pembangkitan Semarang. *The Indonesian Journal of Occupational Safety and Health*, 5(2), 183–191.