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HIRADC Analysis at PT Adhi Karya Mahata Serpong in 2025

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Abstrak

Pentingnya keselamatan dan kesehatan kerja di sektor konstruksi, khususnya di PT Adhi Karya Mahata Serpong, menjadi fokus utama dalam penelitian ini. Seringnya terjadi kecelakaan kerja di industri ini menyoroti perlunya penggunaan teknik HIRADC (Identifikasi Bahaya, Penilaian Risiko, dan Penetapan Pengendalian) untuk mengidentifikasi risiko, mengevaluasi bahaya, dan memilih metode pengendalian yang tepat. Tujuan dari penelitian ini adalah untuk memberikan gambaran menyeluruh mengenai risiko yang ada serta langkah-langkah pencegahan yang dapat diambil. Metodologi penelitian yang digunakan adalah deskriptif kualitatif. Pengumpulan data dilakukan melalui observasi langsung di lapangan dan wawancara mendalam. Manajer dan karyawan PT. Adhi Karya Mahata Serpong menjadi informan dalam penelitian ini. Proses pengumpulan data, yang berfokus pada penilaian risiko pekerja dan identifikasi bahaya, dilakukan dari Desember 2024 hingga Januari 2025. Nomor etik yang digunakan dalam penelitian ini adalah No.10.217.B/KEPKFKMUMJ/XXI/2024. Berdasarkan hasil penelitian, ditemukan sejumlah risiko termasuk paparan bahan kimia, benda jatuh, dan jatuh dari ketinggian. Beberapa aktivitas dinilai berisiko tinggi berdasarkan hasil penilaian risiko, sehingga memerlukan perhatian dan pengelolaan khusus. Dua rekomendasi utama untuk mengurangi risiko kecelakaan adalah penggunaan alat pelindung diri (APD) dan pelatihan keselamatan kerja. Penelitian ini menegaskan pentingnya penggunaan metode HIRADC untuk meningkatkan keselamatan kerja di PT Adhi Karya Mahata Serpong. Untuk memastikan kepatuhan terhadap prosedur keselamatan yang telah ditetapkan, disarankan agar dilakukan program pelatihan keselamatan secara berkelanjutan dan audit secara berkala.

Kata Kunci: *HIRADC, keselamatan kerja, APD*

Abstract

The importance of occupational safety and health in the construction sector, namely at PT Adhi Karya Mahata Serpong, is the main focus behind this research. The frequent work accidents in this industry highlight the need to use the HIRADC (Hazard Identification, Risk Assessment, and Determining Control) technique to identify risks, evaluate hazards, and select appropriate control methods. The purpose of this study is to provide a comprehensive picture of the risks involved and the preventive measures that can be taken. The research methodology used is descriptive qualitative. Direct observation in the field and in-depth interviews were used to collect data. Managers and employees of PT. Adhi Karya Mahata Serpong acted as informants in this study. The data collection process, which focused on worker risk assessment and hazard identification, took place from December 2024 to January 2025. The ethical number used in this study is No.10.217.B/KEPKFKMUMJ/XXI/202. Based on the study, a number of risks were noted including exposure to chemicals, falling objects, and falls from heights. Certain activities were deemed high risk by the risk assessment, requiring extra attention and management. Two key recommendations for reducing the risk of accidents are the use of personal protective equipment (PPE) and workplace safety training. The importance of using the HIRADC method to improve worker safety at PT Adhi Karya Mahata Serpong. To ensure compliance with established safety procedures, it is recommended that ongoing safety training programs and frequent audits be conducted.

Keywords: *HIRADC, occupational safety, PPE*

INTRODUCTION

Occupational health is a branch of health study and practice to help employees achieve the highest possible standard of health. In general, the health referred to includes mental, emotional, social, and physical health. Promotive, preventive, curative, and rehabilitative efforts are carried out to address common diseases and problems or illnesses caused by work or the workplace.(1)

Occupational safety is the workplace, equipment, operating methods, and production processes are all related to the concept of occupational safety (2). Occupational safety and health (K3) is generally defined as the science of anticipating, identifying, assessing and controlling hazards in the workplace that can endanger the health and well-being of employees and considering the potential impacts on the environment, local communities and the general public known as occupational safety and health.(3)

Controlling all potential hazards in the workplace, occupational safety and health aims to protect the health and safety of employees as they perform their duties. The need to protect the health and safety of workers is becoming increasingly urgent as a result of the development of the connected industrial and technological world.(4)

According to Mangkunegara in (5)the objectives of occupational safety and health (K3) including, Every employee has the right to safety and welfare in the workplace, including social and psychological aspects, All tools and equipment are used as efficiently as possible, The safety of every product produced is maintained, Guaranteeing the maintenance and improvement of employee nutritional welfare., Increasing motivation, harmony, and involvement in work, Avoiding health problems caused by conditions or atmosphere in the workplace, Every worker feels safe and comfortable in the workplace. Every company runs an occupational safety and health program to reduce work accidents. To implement, manage risks, and develop company K3 policies, SMK3 is a component of the company system.(6)

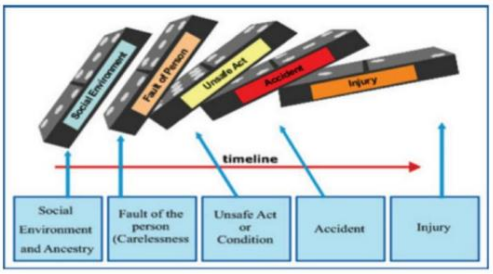
K3 culture as an implementation for aspects to comply with obligations and rules in occupational health and safety. Regulations are made to prevent the occurrence of a situation that causes an accident. For that, it is recommended to provide K3 training or *workshops* in companies such as Audits for internal and external.

Potential Dangers

It is recorded that 88 percent of accidents are caused by *unsafe acts of workers* , 10 percent are caused by *unsafe conditions* and 2 percent of all accidents are caused by things related to acts of God such as natural disasters according to Heinrich (7). According to ILO (1989), there are three main causes of work-related accidents.

First, workplace accidents are significantly influenced by age. In terms of workplace accidents, older people are more likely to be involved than younger people. Second, Workers with low levels of education—such as those who have just completed primary school or have never attended school—are more likely to work in jobs that require physical labor, according to the relationship between education level and available jobs. Third, Work experience is one element that can influence the level of work accidents; research shows that lower accident rates are associated with higher experience and skills.

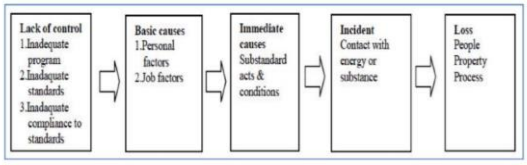
Figure 1 Donimo's Theory of Work Accidents



(Source: Procedia Engineering 194 (2017) 307 – 314)

The domino theory according to Heinrich and Lateiner explains that accidents occur due to five sequences of events, namely, background, personal characteristics, unsafe acts and unsafe conditions, accidents, and injuries, which are represented by a chain reaction of domino cards as in Figure 1. The dominoes that must be targeted are unsafe acts and unsafe conditions.(8)

Figure 2 Cause and Effect Model of Losses



(Source :(Muhydin, 2025))

As seen in Figure 2, the *Bird* and *Germain loss causality model* adds arrows to represent the multi-linear interactions of cause and effect sequences and adapts the domino model with direct managerial relationships to the causes and effects of accident losses.(8)

Figure 1Swiss Cheese Model

Reason's Swiss Cheese Model is a heuristic explanatory device for communicating the interactions and sequences that occur when a complex, well-protected system experiences a catastrophic failure. The model conveys the fact that no single failure, whether human or technical, is sufficient to cause an accident. Rather, it involves the unlikely and often unpredictable interplay of multiple causal factors emerging from multiple levels of the system. The model also demonstrates what defines organizational accidents, namely the simultaneous failure of multiple defenses facilitated in some way by *suboptimal features* of the organizational design as shown in Figure(9)

Heinrich founded the 'Domino theory' which is based on the following five factors. First, social environment and heredity The process of learning practices and skills in the workplace is influenced by the social environment and heredity. Unsuitable social and environmental conditions, as well as lack of ability and knowledge in carrying out tasks will cause someone to make mistakes. Second, these undesirable mistakes (carelessness) can be learned, someone's mistakes and carelessness are bad aspects of someone's character. Carelessness causes dangerous situations or behavior. Third, Dangerous mechanical or physical conditions, meaning errors and technical damage that result in accidents are examples of unsafe actions or conditions. Fourth, Accidents or behavior in an unsafe condition causes accidents that ultimately cause injuries. Fifth, Accidents cause injuries.(10)

HIRADC

Hazard Identification Risk Assessment and Determining Control or HIRADC for short is a methodical and structured approach to detect various risks related to equipment that can harm people, buildings, or existing systems. HIRADC is an effort to determine controls, evaluate risks, and detect hazards. OHS objectives and targets are developed based on the results of HIRADC preparation (11). The purpose of HIRADC is to detect risks, evaluate the level of danger, and select appropriate control strategies. International standards such as the Australian/New Zealand Standards provide credence to this viewpoint (AS/NZS 4360:2004), which provide guidance on systematic risk management. HIRARC can be a fundamental component in the framework of world-related welfare security administration to anticipate and control hazards.

The three components of the HIRADC approach are risk assessment, risk control, and hazard identification. The main basis for setting OHS goals and targets-that is, preventing, reducing, and ultimately eliminating the risk of workplace accidents (*zero accidents*) will be the outcome of HIRADC. The HIRADC method stage begins as follows:

***Hazards* Identification**

Hazard identification is a form of risk that can be recognized as an appropriate effort to distinguish potential risks in environmental work. Hazard identification aims to help in deciding steps to take K3 steps in the company environment and preventive measures. Then, risk identification can identify as many sources of danger as possible and activities that pose risks (12). Hazard identification is carried out to identify risks that may occur in each work process.(13)

Hazard identification requires data that provides information about all potential hazards that arise in the work environment that can affect words related to well-being, calculate physical, chemical, organic, and psychosocial hazards as well as assessing the chances of hazards including, Physical hazards, namely, can include noise, work climate (and cold or hot), brightness (*lighting*), and other physical hazards. Chemical risks, namely, exposure to chemicals in the work environment that can cause health problems such as excessive metal content, soluble compounds, etc. Immediately carry out an examination of B3/hazardous and toxic materials in the work environment. Biological hazards, namely, something related to contact with specialists that cannot be overcome or disease-carrying microorganisms. Psychosocial hazards, namely, include work tension, work temperature loads, or the need for social support in the workplace.

Given the many potential hazards that may arise in the workplace, hazard proofing and risk assessment steps in the workplace are essential to require appropriate safety measures to protect workers. These steps include, collecting and auditing data about all existing and potential hazards in the workplace. This includes distinguishing the risks that exist in each job handle, assignment, or work area for each person. Conduct initial inspections *and* regular reviews of the workplace to identify unused or recurring risks. First examine the occurrence of injuries/traumas (*injuries*), illnesses, incidents, and near misses that occur in the workplace to determine the underlying hazards, their causes, and deficiencies in existing safety and wellness programs. Group incidents, identify and recognize patterns in injuries, illnesses, and hazardous conditions and hazardous acts in detail. Consider risks and hazards that are associated with crises or non-routine circumstances. Conduct risk investigations by determining the seriousness and likelihood of occurrence or work accidents for each known risk.

Use this incident investigation data to prioritize corrective and preventive efforts that should be taken.

Risk Assessment

Risk assessment is the process of evaluating the likelihood and consequences of an identified hazard. This assessment is important to determine the level of risk present in an activity or work process. Risk assessment involves measuring the level of risk and its acceptability by evaluating the likelihood of an accident occurring and the severity of the possible impact. Risk assessment is very important because it can form an opinion about a risk. Risk assessment is carried out after all risks have been identified through risk analysis and evaluation. After eliminating or assessing the severity and frequency of accidents or illnesses that may arise, the risk level of each identified hazard can then be determined. (14)The essence of the accident investigation is to isolate minor hazards that can be managed from significant hazards to provide information to assess the hazard assessment. Risk analysis is carried out based on consideration of the source of risk, the consequences of the hazard and the possibility of identifying the consequences. Risk assessment is carried out based on AS / NZS 4360 1999. Risk assessment measurement consists of two parameters, namely consequences and likelihood. From these risks, they are then assessed and controlled in an effort to reduce the possibility of work accidents.

Table 1Determination of Risk Level

Likelihood	Consequences				
	Insignificance 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (*Almost Certain*)	H	H	E	E	E
B (*Likely)*	M	H	H	E	E
C (*Possible*)	L	M	H	H	H
D (*Unlikely*)	L	L	M	M	H
E (*Rare*)	L	L	L	L	M

The explanation of the table above is, E (Extreme): Very High Risk Until the risk can be reduced the activity must be stopped or suspended, if the risk cannot be controlled with existing resources, the activity should not be continued. H (High): High Risk The risk is identified and managed properly, the activity must be stopped or allowed to continue. To reduce the hazard, it is very important to re-evaluate how resources are allocated. If the hazard remains when the task is being carried out, something must be done immediately. M (Medium): Medium Risk Efforts must be made to reduce the risk, but must be considered carefully and limited to the risks and the cost of the necessary preventive measures. In a certain period of time, an evaluation of risk reduction must be carried out. L (Low): Low Risk No additional control measures are needed because the risk is acceptable. However, monitoring is still important to maintain and implement adequate control . (1)The risk level consists of the lightest or low risk to the most severe or high risk, depending on how to handle it.(15)

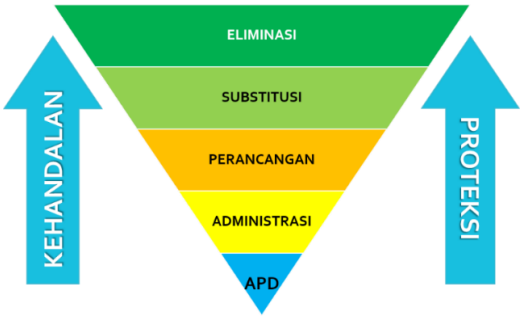
Risk Control

Addressing potential risks in a task is known as risk control. The purpose of risk analysis is to determine the magnitude of the risk by examining the likelihood of occurrence and potential impact. This phase involves internal efforts to address potential hazards in the workplace. To complete this step, first determine the scale. prioritized when selecting controls, which is then named the risk control hierarchy. The order of priority is efforts to reduce the risk of workplace accidents through various procedural means such as controls, engineering controls, substitution, and elimination of personal protective equipment (PPE) administration.

The hierarchy of control is a tiered internal sequence for the prevention and control of possible risks. The hierarchy of

risk control basically refers to the priority ranking of the selection and use of actions related to the risk of danger. Risk control is carried out by implementing a hierarchy of control system as follows:

Figure 4 Control Hierarchy



(Source OHSAS 18001:2007)

Figure 4 explains about, elimination which means removing the cause of the hazard in the workplace. For example, we take immediate action to eliminate the source of the hazard such as oil spills or spills in the workplace. Changing the design to eliminate the risk for example, including mechanical lifting equipment to eliminate the risk associated with physical handling. Second, substitution is the process of changing something that has a high potential hazard with something that has a lower potential hazard. For example, reducing temperature, pressure, power, and electric current. Third, Engineering / Design Control is engineering carried out to reduce the risk that may occur. If the substitution process is not possible, engineering controls can be used. Usually, the cost of replacing equipment and materials limits it. For example, installing *interlocks* , safety devices, ventilation systems, etc. Fourth, Administrative control which refers to the management of risks and hazards through the implementation of occupational safety and health standards. Conducting routine equipment safety inspections is one example, namely safety signs, signs for hazardous areas, signs for pedestrian paths, signs with photo lights, warning lights or sirens, alarms, equipment inspections, access control, safe systems, markings, work permits, and others. Fifth, Personal Protective Equipment (PPE) which is included in the second risk control measure from the back in the K3 hierarchy is personal protective equipment. Gloves, respirators, face shields, safety glasses, and hearing protection are some examples. (16)According to other studies, there can be changes in the personal protective equipment (PPE) used but still follow standard operating procedures (SOP), such as adding glasses with a strap tied to the back of the neck so that they do not fall off during the cutting process or when the worker's body sweats, very important for workers during the cutting process.(17)

METHOD

This study is entitled "HIRADC Analysis at PT Adhi Karya Mahata Serpong in 2025". This study was conducted in November - January 2025 which will be studied at PT Adhi Karya Mahata Serpong in 2025. The type of research used is a qualitative method, namely with in-depth interview techniques *to* be observed orally or in writing. Qualitative methods by triangulation, Source Triangulation and Theory Triangulation. The informants in this study numbered 7 people.

Results

Respondents in the study were obtained from workers along with managers and supporting informants to obtain primary data in the study of each work process. The total at PT. Adhi Karya Mahata Serpong was 7 people. Determining HIRADC and calculating the potential risks, risk assessments, and risk controls of an instrument material or data collection system began in December 2024. Interviews and observations were used in the data collection process. Interviews were

conducted with daily project workers, *engineering technicians* , *scaffolding technicians* , and the head of the QHSE division. Each work process was observed directly to make observations.

The results found at PT. Adhi Karya Maharta Serpong obtained the following results:

Table 1 *Hazard Identification* / Hazard Identification

No	Work Process	Hazard Identification
1.	Lifting and lowering of materials using TC	*webbing* sling broke, fell from a height, TC jeep broke, hit by material, sun radiation
2.	*vertical* iron columns, walls, using TC	*webbing* sling broke, fell from a height, TC jeep broke, hit by material, trapped by a rope
3.	Manual installation of metal floor plates	Stabbed by iron, trapped by a bruise, muscle disorders due to muscle
4.	Dismantling of playwood rafters, beams, horibeams	Falling from a height, falling material, being stabbed, being hit by wood, being exposed to dust, being exposed to noise
5.	Establishing Scaffolding	Hit by scaffolding, falling from a height, being trapped, muscle disorders
6.	Scaffolding Dismantling	Hit by scaffolding, falling from a height, being trapped, muscle disorders

Table 2 Risk Assessment

No	Process Work	Risk	Risk Assessment		
			Possibility (*Likelihood*)	Severity (*Severity*)	Risk Category
1.	Appointment and material lowering using TC	Wounds caused by falling material and being hit by a jeep, exposure to sun radiation	3	4	H
2.	Iron installation *vertical* columns, walls, using TC	Exposure to sun radiation, wounds or injuries from incoming materials	3	4	H
3.	Installation of iron plates manual floor	Exposure to radiation, muscle disorders, injuries	2	2	L
4.	Dismantling of playwood rafters, beams, *horibeams*	Exposed to dust, exposed to noise	3	2	L
5.	Establishing Scaffolding	Wounds caused by being trapped, being hit by scaffolding, and muscle disorders	2	2	L
6.	Scaffolding Dismantling	Muscle disorders	1	2	L

Table 3 *Determining Control* / Hazard Control

No	Work Process	Control
1.	Appointment and material lowering using TC	Use slings, *shackles* , and *lifting lugs* that have passed the inspection, Installation of lifting aids by *riggers* who have the competence to maintain and check TC jeeps, The load being lifted does not exceed capacity, Ensure that the TC *safety device* is functioning properly, Wear *a full body harness* , The operator has a license
2.	Iron installation *vertical* columns, walls, using TC	Use slings, *shackles* , and *lifting lugs* that have passed the inspection, Installation of lifting equipment by competent *riggers , maintenance and checking of TC jeeps, The load lifted does not exceed capacity, Ensure that the TC safety device* is functioning properly, Wear *a full body harness* , Check the condition of the work equipment
3.	Installation of iron plates manual floor	Provide ergonomic training, Use *safety shoes* , Use gloves, Check the condition of work equipment, Workers wear long-sleeved shirts
4.	Dismantling of playwood rafters, beams, horibeams	Use scaffolding for work at heights, Complete work at heights with railings, Use *a full body harness* when working at heights, Complete the work location with safety signs, use PPE, Check the suitability of the condition of the tools to be used
5.	Establishing *Scaffolding*	*Scaffolding* workers have competence, Complete the work location with safety signs, Use *a full body harness* when working at heights, Use gloves, Install a connection between *the scaffolding* and the building, Install lifting equipment (pulleys)
6.	*Scaffolding* Dismantling	*Scaffolding* workers have competence, Complete the work location with safety signs, Use *a full body harness* when working at heights, Use gloves, Install a connection between *the scaffolding* and the building, Install lifting equipment (pulleys)

Table 4 Results of *Determining Control* by QHSE Manager of PT. Adhi Karya Maharta Serpong

1. In the *assembly process* , if there is a hazard, how do you carry out the hazard control process **(lifting and lowering materials using TC)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

2. In the *assembly process* , if there is a hazard, how do you carry out the hazard control process (Installation of *vertical* **iron columns, walls, using TC)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

3. In the *assembly process* , if there is a danger, how do you carry out the process of controlling the danger **(Manual installation of floor plate iron)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

4. In the *assembly process* , if there is a hazard, how do you carry out the process of controlling the hazard **(dismantling plywood rafters, beams, horibeams)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

5. In the *assembly process,* if there is a hazard, how do you carry out the hazard control process **(Establishing scaffolding)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

6. In the *assembly process* , if there is a hazard, how do you carry out the process of controlling the hazard **(Dismantling of Scaffolding)**				
PPE	**Control (Administrative)**	**Control (Technique)**	**Control (Substitution)**	**Control (Elimination)**
✓		✓	✓	

The preparation of the HIRADC analysis at PT. Adhi Karya Maharta Serpong begins with identifying hazards in each process and activity at PT. Adhi Karya Maharta Serpong. Then, conducting an interview and observation process on workers at the PT. Adhi Karya Maharta Serpong project to 7 workers, for other workers carrying out the *ad-hock do check process* . Furthermore, calculating the possibility of danger occurring by calculating (*Likehood x Severity*), and knowing the risk control that occurs in the hope of being able to minimize the potential dangers that will occur. The health and safety of PT. Adhi Karya Maharta Serpong workers are highly prioritized. The HIRADC method itself has been applied to control the health and safety of workers so that by conducting routine risk checks and audits of all workers, it continues to develop. Some of the results of the method at PT. Adhi Karya Maharta Serpong will be explained as follows:

***Hazard Identification* / Hazard Identification**

Based on observations and interviews conducted, there are various hazards identified for workers at heights. Table 1 shows that several work processes can pose risks to worker safety. In the process of lifting and lowering materials using TC Sling *webbing* , there are risks such as broken slings, falling from a height, broken TC jeeps, being hit by materials, and exposure to solar radiation. This can be interpreted that workers involved in this activity must be very careful and equipped with adequate personal protective equipment. In addition, the same risks - such as falling from a height or being hit by materials - arise when iron columns and walls are installed vertically. Then, there is the possibility of being trapped, causing serious injury. Risks associated with manual installation of floor slabs include being stabbed by iron and muscle injuries due to uneven loads. In addition, there is the same risk as falling from a height or being hit by materials when iron columns and walls are installed vertically. The possibility of falling and being hit by materials is a common hazard in the construction sector, according to previous studies such as those conducted by (18). This implies that the methodology used in this study is in line with best practices that already exist in the literature.

Other potential risks that may occur include serious injuries. Risks associated with manual installation of floor slabs include metal impalement and muscle injuries due to uneven loading. Dismantling plywood rafters, beams and horibeams poses additional hazards, such as falls from heights, falling objects, and exposure to dust and noise, which can have long-term negative impacts on workers' health. Scaffolding construction and dismantling are highly hazardous tasks as workers can be crushed by scaffolding, fall from heights or suffer injuries from being trapped. All of these risks highlight the importance of implementing strict safety protocols and providing workers with adequate training to reduce the likelihood of workplace accidents. Taken together, the findings of these risks highlight the importance of workplace safety, especially when working at heights and with large equipment. The same hazards exist in the construction industry, with both (19)suggesting that falls from heights are a major contributor to workplace accidents. Both recommend that workers performing these tasks should have access to adequate personal protective equipment. However, the study adds that psychosocial risks such as stress due to long working hours need to be considered.

Risk *Assessment*

Several work processes that can pose risks to workers, especially in height areas, are listed in Table 2 on risk assessment. There are many risks associated with lifting and lowering goods with tools such as TC Sling *webbing* , these risks include the potential for workers to be hit by objects or jeeps and exposure to sunlight. With a probability value of three and a severity value of four, the risk assessment for this activity places it in the "High" (H) category, indicating that safety needs to be given special attention. This is in line with research (20), which explains that exposure in the workplace can cause long-term health problems such as respiratory diseases and skin irritation.

This study is also in line with the risk analysis in the Factory I area of PT. MII Makassar, it is known that the negative impact of the risk of danger obtained is that workers experience injuries, broken bones, and even disabilities. The company experiences a negative impact, namely losses caused by the care given to workers who have accidents and damage to forklift heavy equipment .(21)

In addition, the same risk also occurs during the installation of vertical iron walls and columns, where workers can be exposed to sunlight and experience injuries or injuries due to falling objects. The risk evaluation for this activity has the same value and is included in the "High" (H) category. With the "Low" (L) category, a probability value of 2, and a severity value of 2, manual installation of floor slabs, on the other hand, shows a lower risk. Radiation exposure, muscle disease, and injury are some of the hazards found. Workers remain exposed to dust and noise during the dismantling of components that are generally low risk such as plywood rafters, and beams. In line with research by (22), on the importance of cleanliness at construction sites to prevent infection and disease, this study also found that workers can be exposed to germs from a dirty work environment.

Another risk is the possibility of injury due to scaffolding being trapped and crushed during the installation and dismantling process. However, the risk assessment of this activity is still classified as “Low” (L). According to the results that have been explained, it is very important to implement safety protocols and use personal protective equipment strictly to ***Determining Control*** **/ Hazard Control**

the Determining Control results , implementing risk control measures is essential to creating a safe work environment, as demonstrated by the interpretation of hazard controls used in various work processes. The use of personal protective equipment (PPE) is a top priority in all activities, including lifting materials and erecting structures. The use of personal protective equipment (PPE), such as gloves and complete *body harnesses*, shows that workers understand the importance of protecting themselves from existing hazards. In addition, the use of personal protective equipment (PPE) is important in emphasizing the importance of engineering and administrative controls, such as ergonomic training and regular equipment inspections, which help prevent accidents before they occur. Physical hazards, such as falls from heights and being hit by objects, are recognized as major occupational hazards in this study and previous studies. Both emphasize the importance of using personal protective equipment (PPE) to reduce these hazards. According to the study, (24)the use of appropriate personal protective equipment (PPE) can reduce the number of accidents that occur on construction sites. In addition, research conducted on building construction projects looks at how risk identification and assessment has been carried out. The results show that risk control is carried out in building construction projects through the creation of work instructions and SOPs at the work site, socialization of the use of safety shoes, and adjustment of workload according to worker capabilities.(25)

Then, the company's commitment to reducing risk through a more proactive approach is demonstrated by the implementation of engineering controls, such as the use of proven lifting equipment and the placement of appropriate equipment. By combining various control techniques, companies can build a lasting safety culture beyond responding to workplace accidents. protect workers from several risks that have been found during the work at height procedure. According to the research findings, PT Adhi Karya Maharta Serpong's hazard management procedures are in line with the hazard control theory needed to prevent accidents(23)

Overall, this study supports the idea that an approach to risk management that addresses every aspect of the control hierarchy can greatly reduce potential risks and improve worker safety. This is in line with occupational safety and health guidelines that must be carried out in every industry.

Based on the analysis of the current study, it can be concluded that, despite significant efforts in risk identification and assessment, there are still challenges in implementation in the field. Therefore, it is very important to conduct a thorough evaluation of the effectiveness of the controls being implemented to ensure that all strategies used are effective in reducing the risk of accidents in the workplace .

Conclusion and Recommendation

The conclusion of this study confirms that the implementation of the HIRADC method is very important to improve worker safety at PT. Adhi Karya Mahata Serpong. It is recommended that the company routinely expand the K3 training program and conduct audits to ensure compliance with established safety procedures. In addition, it is important to increase worker awareness of the importance of using PPE and reporting risks in the workplace.

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BIBLIOGRAPHY

1. Khoiru Rozikin M, Wasiur Rizqi A. K3 Risk Analysis Using JSA and HIRARC Methods Phosphoric Acid Factory on PT. Petrokimia Gresik. Vol. 10. 2024.

2. Vigneshkumar C, Salve UR. End-Users' Opinions to Enhance the Process of Hazard Identification and Risk Assessment (HIRA) in Construction Projects. In: Lecture Notes in Civil Engineering. Springer Science and Business Media Deutschland GmbH; 2022. p. 457–65.

3. Alli BO. Fundamental Principles of Occupational Health and Safety [Internet]. 2008 [cited 21 October 2024]. Available at: https://www.ilo.org/media/326971/download

4. Sastrini YE, Pertiwi NsGH, Khoiri MM. Occupational Health and Safety: A Comprehensive Review. 2023;

5. Rosento, Yulistria R, Handayani, Eka Putri, Nursanty S. The Influence of Occupational Safety and Health (K3) on Employee Work Productivity. SWABUMI JOURNAL. 2021;155–66.

6. Ameiliawati R. Implementation of Occupational Safety and Health with The HIRADC (Hazard Identification, Risk Assessment and Determining Control) Method in The Plant Area-Warehouse. 2022.

7. Shahab Hosseinian S, Jabbarani Torghabeh Z. Major theories of construction accident causation models: A literature review [Internet]. Vol. 4, International Journal of Advances in Engineering & Technology. 2012. Available at: https://www.researchgate.net/publication/268439084

8. Muhydin. Heinrich's Domino Accident Theory. Accident Theory [Internet]. 2024 [cited 21 October 2024]; Available at: https://muhyidin.id/teori-kecelakaan-domino-heinrich/

9. Hollnagel E, Pariès J. Revisiting the "Swiss Cheese" Model of Accidents [Internet]. 2006. Available at: https://www.researchgate.net/publication/285486777

10. Taylor, Geoff, Easter, Kellie, Hegney, Roy. Enhancing Occupational Safety and Health. 2004.

11. Sukwika T, Pranata HD. Analysis of Occupational Safety and Health in the Freight Forwarder Sector Using the HIRADC Method. Jurnal Teknik [Internet]. 29 June 2022 [cited 21 October 2024];20(1):1–13. Available at: https://jt.ft.ung.ac.id/index.php/jt/article/view/182/70

12. Restu, Yuamita F. Analysis of Potential Work Accident Risks in Production Preparation Department Workers Using the HIRADC (Hazard Identification, Risk Assessment and Determining Control) Method. Journal of Applied Industrial Technology and Management. August 31, 2023;2(3):159–67.

13. Alexander H, Nengsih S, Guspari O, Teknik J, Politeknik S, Padang N, et al. Occupational Safety and Health (K3) Study of Beam Construction in Building Construction. Scientific Journal of Poly Engineering. 2019;15(1).

14. Serna Arnau S, Asensio-Cuesta S, Porcar Seder R. Musculoskeletal disorders risk assessment methods: a scoping review from a sex perspective. Ergonomics. 2 December 2023;66(12):1892–908.

15. Karundeng I, Doda DV, Tucunan AAT, Kesehatan F, Universitas M, Ratulangi S, et al. Hazard and Risk Analysis with Hierarchical Method in Production Department of PT. Samudra Mulia Abadi Mining Contractor Likupang North Minahasa. Vol. 7, Jurnal KESMAS. 2018.

16. Mahendra R. Hazard Control Hierarchy in OHSAS 18001:2007. ISO CENTER INDONESIA [Internet]. 2016 [cited 21 October 2024]; Available at: https://isoindonesiacenter.com/hierarki-pengendalian-bahaya-dalam-ohsas-180012007/#:~:text=Basically%2C%20this%20hierarchy%20defines,%2C%2C%20respirators%2C%20and%2C%20gloves

17. Ponda H, Fatma NF. Hazard Identification, Assessment and Control of Occupational Safety and Health (K3) Risks in the Foundry Department of PT. Sicamindo. Journal of Industrial Engineering. 2019.

18. Jazayeri E, Dadi BJ, Dadi GB. Construction Safety Management Systems and Methods of Safety Performance Measurement: A Review. Journal of Safety Engineering [Internet]. 2017;2017(2):15–28. Available at: http://journal.sapub.org/safety

19. Gunduz M, Laitinen H. Construction safety risk assessment with introduced control levels. Journal of Civil Engineering and Management. 2018;24(1):11–8.

20. Kowalik T, Logoń D, Maj M, Rybak J, Ubysz A, Wojtowicz A. Chemical hazards in the construction industry. In: E3S Web of Conferences. EDP Sciences; 2019.

21. Yuli A, Fachrin SA, Baharuddin A, Safety P, Work DK, Community K. HEAT STRESS MEASUREMENT AND RISK ASSESSMENT ON WORKERS OF PT. MARUKI INTERNATIONAL INDONESIA. Vol. 02, Window of Public Health Journal. 2021.

22. Kukathas, Indra. Biological hazards in the working environment [Internet]. ILO. 2022. Available at: www.ilo.org/publns.

23. Friberg E, Lytsy P. Psychosocial interventions at the workplace, a systematic literature review. Eur J Public Health. September 1, 2020;30(Supplement_5).

24. Colares RAL, de Alencar DB, Junior J de AB, da Cruz JC, Bezerra CMVO. The Importance of PPE use in Civil Constructions: Case Study. Journal of Engineering and Technology for Industrial Applications. 2 December 2019;5(20):143–8.

25. Abryandoko EW. Occupational Safety and Health Risk Assessment Using the HIRARC Method and Safety Policy. Vol. 12, CIVIL ENGINEERING. 2018.