



## **Analysis Of Work Risk Level With Suitability Of Safety Sign At Pt. Air Mancur Karanganyar**

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### **Abstract**

Production activities that use machines pose a risk of danger to workers. The maintenance and repair of machines in the production process also has many potential hazards. So the purpose of this study was to analyze the effect of the level of occupational risk on the suitability of the safety sign at PT. Air Mancur Karanganyar. Hazard Identification Risk Assessment Determinant Control (HIRADC) method is a way of identifying hazards, risks and determining control of hazards. This study used a cross sectional quantitative, the sampling technique used was Proportionate Stratified Random Sampling if the population had members or elements that had proportional strata with the samples being 38 people. The inclusion criteria for this study were workers in engineering rooms, Solid External Medicines (OLP), and cosmetics at PT. Air Mancur Karanganyar. Data analysis of a spearman correlation test. The results that there is a significant influence between the Level of Occupational Risk on the Compliance of the Safety Sign at PT. Air Mancur Karanganyar with a significance value of 0.012. The recommendations is are the placement of safety signs such as the Caution for Pinched Hands sign, routine socialization twice a week, and review HIRADC once a year.

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### **Introduction**

Developments in the industrial sector are currently increasing; therefore, we are required to adapt to development in the modern era. Thus, the use of sophisticated tools is increasing; besides providing convenience in work, some hazards pose a risk of work accidents. Several factors that cause work-related accidents are closely related to the machines, work tools, and raw materials in the production process. The work area environment also influences the occurrence of work accidents if a bad work environment causes employees to be uncomfortable and has an impact on worker safety. So awareness is needed from the workers themselves, if workers think that safety is a difficult and unimportant thing then it will harm themselves and those around them (Afianto, 2016).

Based on data from the Disnakertrans of Central Java province in 2018, there were 2329 work accidents with 2328 victims, and for Karanganyar Regency, there were 254 work accidents along with the number of victims. This figure has increased compared to 2017 and 2016 (Disnakertrans Jateng, 2018). Meanwhile, according to work accident data of PT. Jamu Air Mancur recorded that in 2022 there were 4 incidents, then 1 Accident, and 3 near miss cases. PT. Jamu Air Mancur is a global industry that runs in the manufacturing sector, in producing herbs. Technical production activities begin with selecting raw

materials, then grinding, after that sifted, then into semi-finished materials (fines), filling machines (wrapping), and the last process is packaging and packing (PT. Air Mancur, 2019). These production activities use technology and machines that pose a danger to their workers. The maintenance and repair of machines in the production process requires technical assistance, and work has many potential hazards. Thus, K3 culture must be applied in the company.

Efforts made to control risks in the workplace are by implementing the K3 program. Risk control in the form of administration, namely the installation of safety signs. Safety signs based on ANSI standards are safety signs that have a person's appeal that is useful in warning that the area has potential dangers. With the safety sign, someone will know that the area is potentially dangerous. Based on observations in the field, it was found that some rooms did not have safety signs. In the engineering room, there are only 4 signs, namely welding area warning signs, welding glasses warning signs, high voltage alert signs, and exit signs. Then for the Solid Outdoor Medicine (OLP) room, there are 4 signs, namely high noise warning signs, watch out for pinched hands, exit signs, and watch out for hot liquids. Then, for the cosmetic room, there are 2 signs, namely high voltage awareness and exit signs. Meanwhile, according to P2K3 inspection data PT. Air Mancur the engineering room, Solid Outdoor Medicine (OLP), and Cosmetics have a score of 0 which means that the area does not have a system/item/section and is not relevant to the signs in the work area. So it is risky for workers or guests who enter the PT. Air Mancur. The completeness of this safety sign is very important because in some rooms, especially production rooms where some machines or tools are directly related to humans, it causes the risk of accidents. hazards around the workplace. Even so, in reality, many workers still ignore their safety.

Research conducted by (Azady et al., 2018) that of the 80 potential risks contained in the production process, 27 jobs have medium risk (33.3%). According to previous research, conducted by (Nugroho et al., 2019) as many as 20 people, or 50% of the total research respondents that the availability of facilities and infrastructure regarding safety signs does not exist or is still lacking. Meanwhile, according to research (Kurniasari, 2021) in work areas that have a high risk of hazardous work, it is necessary to install a sign "be careful of heavy vehicle lanes" that is easy to reach and see. The purpose of this study is to analyze the Level of Work Risk Against Safety Sign Conformity at PT. Air Mancur Karanganyar.

## Methods

The research design used is *cross-sectional* quantitative research. The purpose of this study was to analyze the effect of the level of occupational risk on the suitability of the safety sign at PT. Air Mancur Karanganyar. The research in question is research to determine the relationship between risk factors and effects, using an observation approach at that time (Sugiyono, 2015). The research design used is *cross-sectional* quantitative research. The research in question is research to determine the relationship between risk factors and effects, using an observation approach at that time (Siyoto & Ali Sodik, 2015). The independent variable in this study is the level of occupational risk and the variable tied to this study is the suitability of safety signs. This study took every member of the population in each room equally, the total sample in this study was 38 people, namely engineering room workers 12 people, Solid Outdoor Medicine (OLP) 11 people, and Cosmetics was 15 people at PT. Fountain. The selection of samples has inclusion criteria a characteristic that must be sufficient for each population selected as a sample. It is that the respondents of this study are workers who work in engineering rooms, Solid Outdoor Medicine (OLP), and cosmetics at PT. Karanganyar Fountain (Adiputra et al., 2021).

The research instruments are HIRADC tables and Observation sheets, with data processing techniques editing data collection using observation and interviews. With data processing techniques Editing That is, the results of the study were examined, Coding is the conversion of data in the form of sentences into data in the form of numbers, and Processing is entering data into the computer system with the application *SPSS for Windows*, Cleaning is a correction made (Notoatmojo, 2012). As well as data analysis tests using Spearman correlation tests.

## Results

The characteristics of respondents in the study include the distribution of respondents based on the specific characteristics of respondents (Occupational risk level and safety sign compliance). The distribution of respondents based on the general characteristics of respondents can be seen in Table 1:

**Table 1.** Frequency Distribution of Respondent Characteristics

Characteristics of Respondents	f	%
<b>Occupational Risk Level</b>		
Low	12	31,6
Medium	16	42,1
High	10	26,3
Ekstrem	0	0
<b>Safety Sign Compliance</b>		
Very Incompatible	12	31,6
Not Appropriate	9	23,7
Quite Appropriate	9	23,7
Appropriate	8	21,1
Perfectly	0	0

Based on the results of the study in Table 1, it can be seen that the level of occupational risk is moderate, which is at most 16 people with a percentage of 42.1%. What does not exist at all is the extreme occupational risk level of 0. And, it can be seen in the characteristics of the conformity of the safety sign that there are 12 that are very incompatible with a percentage of 31.6%. While the very suitable ones do not exist at all.

The level of occupational risk is categorized into 4 parts, namely if the risk is very rare, it may only occur in extraordinary circumstances then it is categorized as Low; if the risk is likely to occur at some time then it is categorized as Medium; if the risk is likely to occur in various circumstances then it is categorized as High; If the risk of events occurs frequently, anytime can occur then it is categorized as Extreme. As for the suitability of safety signs categorized into 4 parts, namely if the area/place has no danger signs at all, warning signs, alert signs, and attention signs then Very Inappropriate; if the area/place has one, the placement and size are not up to standard among danger signs, warning signs, alert signs, and attention signs then Not Appropriate; If the area/place is one, the placement and size are according to standards between danger signs, warning signs, alert signs, and attention signs then Quite Appropriate; if there are several areas/places, placement, and size are not up to standard among danger signs, warning signs, alert signs, and attention signs then Appropriate; and if there are several areas/places, the placement, and size are up to standard among danger signs, warning signs, alert signs, and attention signs then Very Appropriate.

**Table 2.** Spearman Correlation Test Results

Characteristics of Respondents	Occupational Risk Level			p-value	Correlation (r)
	Low	Medium	High		
<b>Safety sign compliance</b>					
Very Incompatible	2	4	6	0,12***	-0,404
Not Appropriate	3	2	4		
Quite Appropriate	4	5	0		
Appropriate	3	5	0		

\*\*\*  $p > .005$ .

From the results of Table 2, it is known that the level of low risk with the suitability of the safety sign is very inappropriate as many as 2 respondents (5.3%), the level of low risk but the suitability of the safety sign is not suitable as many as 3 respondents (7.9%), the level of low risk with the suitability of the safety sign is quite appropriate as many as 4 respondents (10.5%), and the level of low risk but the suitability of the safety sign is appropriate as many as 3 respondents (7.9%). Meanwhile, if the medium risk level with the suitability of the safety sign is very inappropriate as many as 4 respondents (10.5%), the level of medium risk but the suitability of the safety sign is not appropriate as many as 2 respondents (5.3%), the medium risk level with the suitability of the safety sign is quite appropriate as many as 5 respondents (13.2%), and the level of medium risk but the suitability of the safety sign is appropriate as many as 5 respondents (13.2%). If the level of high risk with the suitability of the safety sign is very inappropriate as many as 6 respondents (15.8%), the level of risk is high but the suitability of the safety sign is not suitable as many as 4 respondents (10.5%), and the level of risk is high but the suitability of the safety sign is quite appropriate and appropriate does not exist at all.

Based on the table, it is known that the significance value for the effect of the level of occupational risk on Safety Sign Conformity is  $0.012 < 0.05$  with a correlation level classified as sufficient at  $-0.404$  which means that these two variables are not in the same direction that the level of occupational risk increases, the suitability of the safety sign decreases, so it can be concluded that H2 is accepted which means there is an influence of the level of occupational risk on Safety Sign Conformity.

## Discussion

Assessment of the level of occupational risk in this study uses the HIRADC (Hazard Identification Risk Assessment Determinant Control) method, which is a method used in identifying hazards, and risks and determining control of hazards in the environment around work (Widyantoro et al., 2020). This method includes risk management steps to manage risk so that it can be controlled. Jobs that have a high risk, have a greater chance of accidents. So, the higher the level of occupational risk, the higher the risk of work accidents.

According to this study, workers who have a moderate risk level are as many as 16 people (42.1%) out of 38 workers. So this research is in line with research conducted by (Azady et al., 2018) that of the 80 potential risks contained in the production process, 27 jobs have medium risk (33.3%). Meanwhile, according to research (Haslindah et al., 2020) there are 16 sources of danger with moderate risk, namely hitting the foot, disturbing the respiratory system, slipping, and fatigue. While in the study of production hazard risk analysis based on work environment factors using the HAZOP method by (Andi Haslindah dkk., 2019) stated that there are 11 sources of danger classified as extreme, 31 sources of danger classified as high, 109 sources of danger classified as moderate, and 6 sources of danger classified as low.

Based on the HIRADC table, of the 58 potential risks, 30 of them have moderate risk. This is supported by the situation in the field that in employee work activities many machines and tools support the work process. One of them is during the preparation of tools, workers who are less vigilant when carrying out the tool preparation process have the potential to pose a danger, namely the hands pinched by the herbal filling machine.

Workers usually do work that is directly related to machines, because to speed up work and can meet predetermined targets. So in their work do not escape the risk of existing dangers. In addition, workers neglect the machine that is running and assume that they are used to carrying out their work or have memorized the working system of the machine. This situation is shown by the results of research that in the engineering, cosmetics, and OLP (Solid Outdoor Medicine) rooms there are more than 50 rotating machines.

The suitability of Safety Signs in the Engineering, Cosmetic, and OLP (Solid Outdoor Medicine) rooms is included in the category of very inappropriate, this is evidenced by the assessment results with a percentage of 31.6%. Of the 38 respondents, there were 12 people (31.6%) were in the work area whose safety signs were very inappropriate such as the absence of pinched hand signs on cosmetic filling machines, while 9 people (23.7%) who did not match the safety signs such as there were noise area danger signs but the size did not meet the standards so that if the long visibility was not visible and 9 people (23.7%) the safety sign was quite appropriate as evidenced by the engineering room already in place sign but not maintained properly so it peels off, and 8 people whose safety signs are appropriate such as the OLP (Solid Outdoor Medicine) mixing area have installed several appropriate safety signs such as watch out for pinched hands because the area has machines that have the potential to cause a pinched hand hazard. But the area that is very suitable for the safety sign does not exist at all.

Risk control in the form of administration, namely the installation of safety signs. Safety signs based on ANSI standards are safety signs that have a person's appeal that is useful in warning that the area has potential dangers. With the safety sign, someone will know that the area is potentially dangerous. The completeness of this safety sign is very important because in some rooms, especially production rooms where some machines or tools are directly related to humans, it causes the risk of accidents. hazards around the workplace. Even so, in reality, many workers still ignore their safety.

According to previous research, conducted by (Nugroho et al., 2019) as many as 20 people, or 50% of the total research respondents that the availability of facilities and infrastructure regarding safety signs does not exist or is still lacking. Meanwhile, according to research (Alfidyani et al., 2020) as many as 31 workers already have a good understanding of safety signs, but the company does not pay attention to the availability of safety signs so it can be bound that the safety signs are insufficient and less specific to the risk of danger in the company.

The results of the data analysis show that most of the workers at PT. Fountains in engineering, cosmetic, and OLP (Solid Outdoor Medicine) rooms have a moderate occupational risk level. Where the average work of employees in each room shows a moderate job risk value. While the results of field observations that some work areas have installed signs the size and materials used on the signs are not appropriate. So that some of the color signs have begun to fade.

From the results of table 2, it is known that the level of low risk with the suitability of safety signs is very inappropriate as many as 2 respondents (5.3%) such as equipment preparation activities that are at risk of electrocution, packaging sachets that have the potential to be cut by paper, and weighing materials that have the potential to be cut by cater; low risk level but safety sign suitability is not appropriate as many as 3 respondents (7.9%) such as manual powder retrieval activities that have the potential for back muscle pain, maintenance of production machines that have the potential to be exposed to powder dust, and operation of OLP (Solid External Medicine) oven machines that are at risk of bruising hands; low risk level with safety sign suitability is quite suitable as many as 4 respondents (10.5%) such as workers' legs crushed by trolleys during the transfer of goods; and the level of risk is low but the suitability of the safety sign is appropriate as many as 3 respondents (7.9%) such as the process of connecting iron plates that are at risk of electrocution, transfer of powder results in the opening process that is at risk of exposure to dust. Meanwhile, if the level of risk is medium with the suitability of safety signs is very inappropriate as many as 4 respondents (10.5%) such as the powder mixing process which is at risk of being crushed by engine rotation, and the operation of OLP (Solid Outer Medicine) filling machines that are at risk of being pinched; moderate risk level but safety sign suitability is not appropriate as many as 2 respondents (5.3%) such as granulation machine operation activities that are at risk of crushing, talc sieving which causes noise from the machine to cause deafness; the level of moderate risk with the suitability of the safety sign is quite appropriate as many as 5 respondents (13.2%) such as in the process of cutting iron plates that cause noise causing deafness; and the level of risk is moderate but the suitability of the safety sign is appropriate as many as 5 respondents (13.2%) such as in the process of operating a printing machine that is at risk of exposure to powder dust, and when the process of connecting iron plates causes sparks that risk blindness. If the level of high risk with the suitability of the safety sign is very inappropriate as many as 6 respondents (15.8%) such as workers who do oil soaking risk blistering the skin of the hands; While the level of risk is high but the suitability of the safety sign is not appropriate as many as 4 respondents (10.5%) such as the process of pouring oil which is at risk of irritation to the hands, and the level of risk is high but the suitability of the safety sign is quite appropriate and appropriate does not exist at all. It can be concluded that there is an influence on the level of work risk on the suitability of the Safety Sign.

Identification of the level of occupational risk with *the Hazzard Identification Risk Assessment Determination Control* (HIRADC) method is a method used in identifying hazards, and risks and determining control of hazards that exist in the work environment (Widyantoro et al., 2020). After identification using HIRADC, we can find out that the level of work has high, medium, and low risk. If the risk is very rare, it may only occur in extraordinary circumstances then it is categorized as low, then if the risk can occur at any time, the possibility of occurring is very low then it is categorized as low, then if the risk may occur at some time it is categorized as medium, if the risk may occur in various circumstances it is categorized as high, while if the risk of events often occurs, Anytime it can happen then it is categorized as extreme. Then if the level of work risk is in the moderate, high, or extreme category, control is needed in the form of administrative steps in the form of installing *safety signs*.

Based on the theory put forward by (Widyantoro et al., 2020) the level of occupational risk in the moderate, high, or extreme categories requires control in the form of installing *safety signs*. This is in line with research (Kurniasari, 2021) That in work areas that have a high risk of hazardous work, it is necessary to install *a sign* "Be careful of heavy vehicle lanes" that is easy to reach and see. Meanwhile, according to research (Nugroho et al., 2019) there is a relationship between the installation of *safety signs* and the risk of work accidents among workers in the *cutting* section of the Garment Industry in Semarang City with a significance value of  $0.001 \leq 0.05$ . While research at PT. Most Karanganyar Fountain is a high-risk level with safety sign *suitability* very inappropriate as many as 6 respondents (15.8%) with a p-value of  $0.011 < 0.05$  with a correlation level classified as sufficient at 0.408, so it can be concluded that there is an influence of the level of occupational risk on Safety Sign Conformity.

According to researchers, the high level of occupational risk causes work accidents in employees so hazard control is needed, namely the installation of *safety signs* by ANZI standards. With this installation, it is expected to minimize the dangers that exist in the work area. The result of this study is that the level of occupational risk is affecting the suitability of *safety signs* that are very inappropriate. Evidenced by several work areas that have a moderate level of occupational risk such as herbal filling activities that have the potential for hands to be pinched with very inappropriate safety signs. In the work area, the color of the safety sign has faded because the sign in the area is made of paper material coated with plastic that is not up to standard.

The limitations of this research focus on Work Risk Level With Suitability Of Safety Signs in Engineering Rooms, Solid External Medicines (OLP), and cosmetics at PT. Air Mancur Karanganyar.

## Conclusion

In this study, it can be concluded that the level of occupational risk at PT. Air Mancur Karanganyar is mostly in the medium category (42.1%), the suitability of safety signs at PT. Air Mancur Karanganyar is mostly in the very inappropriate category (31.6%). There is an influence between the Level of Work Risk on the Conformity of Safety Sign at PT. Karanganyar Fountain as evidenced by the calculation of p-value values of  $0.12 < 0.05$  with a fairly strong correlation level of  $-0.404$ .

So the advice that researchers give to PT. The fountain is the attachment of safety signs by standards in the potentially dangerous work area, socializing about hazards in the workplace, and socializing existing safety signs.

### Author Contributions

Conceptualization, A.U.; methodology, A.U.; software, A.U.; validation, A.U.; formal analysis, A.U.; investigation, A.U.; resources, A.U.; data curation, A.U.; writing—original draft preparation, A.U.; writing—review and editing, A.U.; visualization, A.U.; supervision, P.A and A.S.; project administration, A.U.

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### Institutional Review Board Statement

The study was conducted by the CIOM 2016, and approved by or Ethics Committee of STIKES Bhakti Husada Mulia Madiun (002/E-KEPK/STIKES/BHM/V/2023 and 8 May 2023).

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### Conflicts of Interest:

The authors declare no conflict of interest.

### References

- Adiputra, M. S., Trisnadewi, N. W., Oktaviani, N. P. W., Munthe, S. A., Hulu, V. T., Budiastutik, I., Faridi, A., Ramdany, R., Fitriani, R. J., Tania, P. O. A., Rahmiati, B. F., Lusiana, S. A., Susilawaty, A., Sianturi, E., & Suryana, S. (2021). *Health Research Methodology* (R. Witriantnos & J. Simarmata (eds.)). (Yayasan Kita Menulis).  
<https://books.google.co.id/books?id=DDYtEAAAQBAJ&printsec=frontcover&hl=id#v=onepage&q&f=false>
- Afianto, S. N. (2016). *The relationship between knowledge and attitudes with the actions of workers at work Appropriate Safety Sign Boards Installed (Studi in Sub Divided Wood Working 1 PT. Kutai Timber Indonesia Probolinggo)*.
- Alfidyani, K. S., Lestantyo, D., & Wahyuni, I. (2020). *The relationship between K3 training, the use of PPE, the installation of safety signs, and the application of SOP with the risk of work accidents ( Study On Industri Garmen, Semarang city )*. 8.
- Azady, A. A. A., Widowati, E., & Rahayu, S. R. (2018). The Use of Job Hazard Analysis in the Identification of Work Safety Risks in Metal Craftsmen. *HIGEIA (Journal of Public Health Research and Development)*, 2(4), 510–519. <https://doi.org/10.15294/higeia.v2i4.23564>
- Disnakertrans Jateng. (2018). *Employment and Transmigration Statistics Data Book for Semester II*. <http://disnakertrans.jatengprov.go.id>
- Haslindah, A., Andrie, A., Aryani, S., & Nur Hidayat, F. (2020). Application of the HAZOP method for occupational safety and health in the production of bottled drinking water in the cup PT. Tirta Sukses Perkasa (CLUB). *Journal Industrial Engineering & Management (JUST-ME)*, 1(1), 20–24. <https://doi.org/10.47398/just-me.v1i1.511>
- Kurniasari, D. (2021). *Occupational Health and Safety Risk Assessment With Metode Job Safety Analysis (JSA) In the Area Batching Plant in PT Berdua Multi Niaga in 2021*. STIKIM.
- Lailan, S., Saragih, N., & Sakit, R. (2020). The importance of K3 policy in the scope of nursing. *Osfpreprints*.
- Muhammad, I., & Susilowati, I. H. (2021). Analysis of K3 Risk Management in the Manufacturing Industry in

- P.A Wibowo et al., / International Journal of Health Literacy and Science *Special Issue 1 (2) (2023)*  
Indonesia: Literature Review. *PREPOTIF: Journal of Public Health*, 5(1), 335–343.  
<https://doi.org/10.31004/prepotif.v5i1.1635>
- Notoatmojo, S. (2012). *Health Research Methodology*. PT Rineka Cipta.
- Nugroho, A. S., Kurniawan, B., & Widjasena, B. (2019). The relationship of worker perception, availability and safety sign layout with worker compliance (case study on workers in the warehouse Finished Goods PT Indofood Cbp Sukses Makmur Tbk Semarang). *Journal of Public Health (e-Journal)*, 7(4), 336–340.
- PT. Air Mancur. (2019). *The sophisticated production process of Jamu Air Fountain, international quality*.
- PT Geospasial Insan Mulia. (2021). *The Importance of K3 (Occupational Health and Safety) in the Industrial Sector*. <https://gim-indonesia.com/pentingnya-k3-di-pabrik/>
- Salsabila, S. (2020). Analysis of factors affecting work accidents in fishermen in the coastal area of Belawan. In *Journal of Public Health Universitas Islam Negeri Sumatera Utara* (Vol. 2, Issue 1).
- Simbolon, N. H. (2017). *Factors Associated with Unsafe Behavior in Oil Palm Harvester Workers PTPN IV Jambi Bah Plantation*. 4–16.
- Siyoto, S., & Ali Sodik, M. (2015). *Basic Research Methodology*. 1–109.
- Sugiyono. (2015). *Educational Research Methods* (22nd ed.). Alfabeta,cv.
- Widyantoro, A. E., Syakur, A., & Wibowo, M. A. (2020). Manual ISO 45001: 2018. *Worker Health and Safety Management System ISO 45001:2018, 0274*, 1–71.