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# Analysis of Factors Related to Worker Compliance Using Personal Protective Equipment in Madubaru Inc Yogyakarta

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**Abstract**

**Introduction:** The implementation of occupational health and safety among the industrial circle and society in Indonesia is still relatively low, thus resulted in an occupational accident. Preventive attempts or anticipation for occupational accidents can be conducted by fostering habituation of order, discipline, and maintaining a healthy and safe environment through worker compliance to Personal Protective Equipment (PPE). The use of Personal Protective Equipment will safeguard the workers from potential hazards in the workplace. This research aims to find factors related to worker compliance in using Personal Protective Equipment in Madubaru Inc. Yogyakarta. **Method:** This research is correlation research with the cross-sectional approach. The sample in this research are 86 workers, in steam boiler station and milling obtained using purposive sampling. Data collection is conducted through the Personal Protective Equipment compliance questionnaire. Additionally, data analysis is performed using a correlation analysis test with chi-square with a confidence level of 95 % ($\alpha$= 0.05). **Result:** The finding of this research showed that 76. 7 % of workers did not comply with the utilization of PPE. All variables were not related to the worker compliance in using PPE that is age (p-value 0. 942), education (p-value 0.300), the length of employment (p-value 0. 077), employment status (p-value 0. 797), knowledge (p-value 0. 961), attitude (p-value 0. 780), motivation (p-value 0. 487), supervision (p-value 0.674), and PPE availability (p-value 0.222). **Conclusion:** It can be concluded that individual characteristics, knowledge, attitude, motivation, supervision, and availibility had no significant correlation with PPE compliance in Madubaru Inc. Yogyakarta.

**Keywords:** Compliance; Personal Protective Equipment; Workers

## Introduction

Regulation of The Minister of The Manpower Number 6 of 1996 explained that a company is a private or state-owned business entity that employs workers for-profit or non-profit. Companies are required to implement occupational health and safety. Hence, companies are obligated to maintain and manage their workers in terms of occupational health and safety to foster an integrated working environment and conditions that enable to create a sense of safety as a means to reduce accidents (1)

The implementation of occupational health and safety conditions within the industrial circle and society in Indonesia is considered low, thus resulted in accidents at work. According to the annual report of the PT Madubaru polyclinic, some of the most

common workplace accidents among employees, particularly those at the grinding and evaporation stations, include falls from the grinding floor, hands getting trapped in machine covers, burns from the boiler fire, and heat stress due to temperatures reaching 1300 degrees celsius in the boiler station. Occupational health and safety (OHS) are mean created to establish a healthy work environment, safe and pleasant that leads to positive impacts with increased work productivity and workers are prevented from occupational accidents. OHS are protecting workers refer to the physical and psychological condition of workers while in the workplace (2).

OHS are essential because it is closely related to human survival. The purpose of occupational health and safety is to prevent, reduce, and eliminate occupational accidents (zero accidents). OHS are intended to protect workers while conducting their work, to create worker's protection of their right to safety at work, and to establish healthy and productive workers. When companies do not administer occupational health and safety, the possibility of the company's loss and occupational accidents increased (3).

Preventive attempts or occupational accident anticipation can be achieved by fostering habituation, discipline, and maintaining a healthy, safe, and pleasant environment. To minimize the risk of occupational accidents, companies are obligated to provide PPE, and workers should wear the appropriate PPE when they are entering the workplace (4). To prevent occupational diseases and accidents, PPE is needed. Namely, safety helmets, eye protection, face protection, ear protection, respirator, gloves, safety shoes, body protection, and safety harness. Compliance is behavior carried out according to established and agreed-upon rules. Compliance is a term that refers to participation in problem-solving and decision-making regarding behavioral change. This change is a voluntary action known as adherence. Every worker must be able to comply with the company policies in wearing PPE.

Based on the previously mentioned background, it is deemed necessary to conduct further research concerning the factors related to the worker’s compliance to PPE in Inc Yogyakarta.

**Methods**

This research is correlation research with the cross-sectional approach. This research is conducted in the Madukismo Inc Yogyakarta. The time of the research is between Augusts to October 2020. The sampling technique in this research is completed

using purposive sampling, with the number of samples is 86 workers in the mill and steam boiler station. The inclusion and exclusion criteria in this research are the workers in Madukismo Inc, the minimum age 18 years old, and the length of employment is six months include seasonal workers (Karyawan Kerja Waktu Tertentu). Meanwhile, the exclusion criteria are workers who did not attend and decline to be involved in this research. The free variables in this research are knowledge, attitude, motivation, supervision, and availability of PPE. The related variable in this research is the workers' compliance in using PPE. The data collection is completed through a questionnaire and PPE usage compliance observation sheet which has been tested by content validity index including three expert according to their fields namely one practitioner as mentor of occupational health and safety, two lecturers who focus on occupational health nursing with I-CVI and CVR 0,8-1, that means have good validity and represent construct being measured (5). The data analysis is using a chi-square correlation test, with a confidence interval of 95 % (α= 0. 05). This research has passed the ethical code from Jenderal Achmad Yani University Yogyakarta with the decree No Skep/024/KEPK/III.

## Results

### Univariate Analysis

Univariate Analysis

The result of this research is obtained based on the independent variables, namely the factors related to the workers' compliance, and dependent variables of the workers' compliance in wearing PPE as illustrated in the next table.

Table 1. The Workers' Characteristics related to the compliance of wearing PPE in Madubaru Inc., (n=86).

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Age** | | |
| Young adult (18-40 years old) | 51 | 59.3 |
| Later adult (>40 years old) | 35 | 40.7 |
| **Education** | | |
| Primary school | 1 | 1.2 |
| Junior High School | 10 | 11.6 |
| Senior High School | 74 | 86 |
| University | 1 | 1.2 |
| **Length of employment** | | |
| < 5 years | 18 | 20.9 |
| ≥ 5 years | 68 | 79.1 |

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Working unit** | | |
| Boiler (ketel uap) | 42 | 48.8 |
| Milling (penggilingan) | 44 | 51.2 |
| **Total** | 86 | 100 |

A total 86 employees were participated in this study. The majority ages were young adult (59,3%) and have high school education level (86%). Most of them have been working for more than five years (79,1%).

Table 2. Frequency Distribution Factors related to compliance using PPE at PT Madubaru (n = 86)

| Variable | Frequency (n) | Percentage (%) |
|---|---|---|
| **Knowledge** | | |
| Good | 52 | 60.5 |
| Poor | 34 | 39.5 |
| **Attitude** | | |
| Good | 58 | 67.4 |
| Poor | 28 | 32.6 |
| **Motivation** | | |
| Positive | 53 | 61.6 |
| Negative | 33 | 38.4 |
| **Supervision** | | |
| Good | 53 | 61.6 |
| Poor | 33 | 38.4 |
| **Availability of protective equipment** | | |
| Adequate | 55 | 64 |
| Inadequate | 31 | 36 |
| Total | 86 | 100 |

Based on the table 2, 60,5% workers had good knowledge, 67,4% had good attitude, 61,6% had positive motivation and supervision, and 64% had adequate availability of personal protective equipment.

Table 3. Distribution of Compliance Frequency of Workers Using PPE at PT Madubaru (n = 86)

| Compliance | Frequency (n) | Percentage (%) |
|---|---|---|
| Compliant | 20 | 23.3 |
| Non-compliant | 66 | 76.7 |

Table 3 showed that majority of workers aren’t compliant in using PPE (76,7%), while 23,3% of them are compliant.

Table 4. Cross Tabulation and Chi-Square Test Results. Factors Related to Worker Compliance Using PPE at PT Madubaru (n = 86)

| Variable | Compliance of wearing PPE | | | | | | P value |
|---|---|---|---|---|---|---|---|
| | Non-compliant | | Compliant | | Total | | |
| | n | % | n | % | n | % | |
| **Age** | | | | | | | 0.942 |
| Young adult 18-40 | 39 | 45.3 | 12 | 14.0 | 51 | 59.3 | |
| Later adult >40 | 27 | 31.4 | 8 | 9.3 | 35 | 40.7 | |
| **Education** | | | | | | | 0.300 |
| Primary school | 1 | 1.2 | 0 | 0.0 | 1 | 1.2 | |
| Junior high school | 8 | 9.3 | 2 | 2.3 | 10 | 11.6 | |
| Senior high school | 57 | 66.3 | 17 | 19.8 | 74 | 86.0 | |
| University | 0 | 0.0 | 1 | 1.2 | 1 | 1.2 | |
| **Length of employment** | | | | | | | 0.077 |
| <5 years | 11 | 12.8 | 7 | 8.1 | 18 | 20.9 | |
| ≥5 years | 55 | 64.0 | 13 | 15.1 | 68 | 79.1 | |
| **Knowledge** | | | | | | | 0.961 |
| Deficient | 26 | 30.2 | 8 | 9.3 | 34 | 39.5 | |
| Good | 40 | 46.5 | 12 | 14.0 | 52 | 60.5 | |
| **Attitude** | | | | | | | 0.780 |
| Deficient | 22 | 25.6 | 6 | 7.0 | 28 | 32.6 | |
| Good | 44 | 51.2 | 14 | 16.3 | 58 | 67.4 | |
| **Motivation** | | | | | | | 0.487 |
| Negative | 24 | 27.9 | 9 | 10.5 | 33 | 38.4 | |
| Positive | 42 | 48.8 | 11 | 12.8 | 53 | 61.6 | |
| **Availability** | | | | | | | 0.674 |
| Inadequate | 23 | 26.7 | 8 | 9.3 | 31 | 36.0 | |
| Adequate | 43 | 50.0 | 12 | 14.0 | 55 | 64.0 | |
| **Supervision** | | | | | | | 0.222 |
| Deficient | 23 | 26.7 | 10 | 11.6 | 33 | 38.4 | |
| Good | 43 | 50.0 | 10 | 11.6 | 53 | 61.6 | |

## Discussion

In this study, the data were obtained through the worker's characteristics. The table distribution is explained below as follows.

### Workers Characteristics

Table 1 showed that the majority of workers at Madubaru Inc are classified as young adults at 59.3%. The youngest worker was 21 years old and the oldest 55 years old. Based on Pasal 68 UU No 13 tahun 2003 tentang ketenagakerjaan, it is stated that the minimum working age is 18 years, so the company has followed the rules required by the government (6). The majority of workers' education is high school level, about 86%. Most of the respondents have worked for ≥ 5 years, amounting to 79.1%, where the longest working period is 34 years. Madubaru Inc has been operating since 1958. Based on PT Madubaru's profile, 77,9% workers are non-permanent that known as seasonal employees or in bahasa

Karyawan Kerja Waktu Tertentu (KKWT), they only work during the production period, which is once a year for a six-month period, from May to October.

**Compliance Using PPE-related factors**

Table 2 showed that the majority of workers that have good knowledge and attitude. Their knowledge and attitude are expected to implement at work. This results are in line with other, 73% and 62,2% chemical industry workers in Gresik have good knowledge and attitude (7). Positive motivation is shown in the majority of the workers, the number is 61.6 %. The result in line with study before, majority of 76,5% nurses are motivated in using PPE. Motivation is an effort to encourage person to optimally corporate in achieving the certain goal (8).

This research also found a good level of supervision toward the use of PPE, the number is 61.6 %. Based on the Aisyah study found that 88,7% and 90% industrial workers considered that supervision and availability of PPE are quite effective to support compliance in using PPE and the impact will be felt on occupational health maintenance (9). The company had provided PPE such helmets, shoes, gloves, masks, earplugs, and glasses. All the PPE has been adjusted to the type of work in this company. The sufficient PPE availability provide convenience for the workers in complying with the regulation enforced by the company regarding the use of PPE as mandated by the regulation.

**Compliance in Using PPE**

Table 3 showed that the majority of workers, 66 (76.7%), did not comply with PPE use. This indicates that workers continue to neglect personal safety and health protection. This is supported by observations that PPE was not fully used while working, with 51.2% of workers not wearing safety helmets. These results are in line with research by Khoshaklagh found that 27,7 % of 350 workers in small and medium-sized enterprises did not use PPE while working (10). In addition, other study found that 62% of 206 building construction workers in Ethiopia did not use PPE. They added that the reasons for workers not using PPE were the unavailability of PPE (41.1%), lack of orientation on PPE use (21.3%), discomfort when using PPE (16.3%), the perception of PPE as unimportant (11.3%), and 10% of workers had no reason (11). Study literature review by Bayati et al found causes personal protective equipment non compliance are PPE design factor such discomfort, safety climate such PPE restrict movement and need more time, safety culture such uneducated how to use PPE; no spesific rules and regulation to use PPE, and other

factor such employee status and somatic health effect such causes stress while using PPE (12).

PPE serves to protect and maintain worker safety when performing work that carries potential hazards or risks of workplace accidents. Research shows a significant relationship between PPE use and workplace accidents, with non-compliance with PPE use increasing the number of workplace accident (13). Lack of use of PPE increases the risk of work accidents in construction workers by 3.6 times (14).

**Cross tabulation of Factors Related to Worker Compliance Using PPE**

Table 4 showed the relation between the working unit and the compliance in wearing PPE showed insignificant results with the p-value >0.05. The working units used in this research are boiler unit and milling unit, with the most respondents were from the milling unit 44 (51.2%) respondents. In research conducted by other researcher, reported that out of four working units that he investigated, there was only one working unit that complies well with the PPE use. The workers who did not comply with the use of PPE had several reasons, such as insufficient PPE availability, lack of practical ability in wearing PPE, unpleasantness, and lack of education concerning the importance of wearing PPE (15). The workers, who tended not to wear PPE, were shaped by their working environment. argued that the lack of compliance in wearing PPE can be influenced by the inadequate sanctions for the offenders (16). Therefore, a regulation that enforced the importance of wearing PPE complete with firm sanctions for the offenders is needed to be established.

In this research, there is no significant relationship between age and the compliance of wearing PPE among workers, with a p-value of 0.942. This finding is in line with other that stated there was no relation between age and the level of compliance in wearing PPE in workers (17). However, the research by Mehrparvar et al, there were differences in the use of PPE between the age ranges of workers, where the younger workers have lower compliance with the PPE use The majority of respondents in this research are of productive ages that are 18-40 years old (59.3 %) . The productive age workers (≤30 years old) have less favorable knowledge and attitude toward the effort of occupational accident control. Hence, the risk of injury increased compared to older workers. The lack of compliance in wearing PPE is influenced by the co-workers and the lack of working experience in younger workers (18).

The relation between education and compliance toward PPE use is insignificant, with a p-value of 0.300. The majority of respondents are high school educated 86 %. The education was not a factor related to the compliance toward PPE use with p-value >0.05. The respondents in the two research were mostly high school educated. In this research, the length of employment was also insignificant to the compliance of PPE use, which was 0.077. As many as 68 (79.1%) of respondents, had worked for more than four years. The length of employment did not become a factor related to the compliance of PPE use. The compliance to PPE use was more determined by the presence or absence of the occupational safety training, the company's regulation regarding the use of PPE, and the working area (12). The reasons that workers did not wear PPE could be discomfort, difficulty in wearing PPE, and disrupting communication.

The result of the hypothetical test using chi-square showed that the knowledge related to PPE, attitude, motivation, PPE availability, and supervision is not related to the compliance of PPE use. This finding is not in line with the research conducted by Alemu et al (2020) that found knowledge to be connected to the compliance of PPE use. In another research, it was stated that the PPE availability becomes one of the predictors of the compliance of the PPE use. The results of the relationship between PPE supervision and compliance with the use of PPE in this study were not significant. This is in contrast to the usage supervision function, which can increase worker compliance (19). Even-though knowledge and attitude toward occupational safety were good among workers. Yet, many external factors have effects to reduce occupational accidents. Workers with good or poor knowledge have almost the same percentage of non-compliance in using PPE. The majority of workers have good knowledge, but the fact is that good knowledge did not guarantee someone to comply with using PPE. This is due to the knowledge that workers have at the first level, namely knowing that they have not yet reached the level of understanding and applying. Also, theoretically, individual preventive behavior is formed by complex interactions involving socio-demography, behavior, and the environment. Information exposure is one of the things that determined a person's behavior to be healthy or not (20). In this research, the information exposure presented was in the form of counseling on the use of PPE, where 70 respondents or 81.4% of respondents stated that they had received PPE counseling. Even though they had been exposed to outside information about the use of PPE through yearly training, there was no clear sanction for PPE violators. Regulation

becomes a part that played a crucial role in ensuring worker's occupational safety. Regulation that governs the compliance of PPE use well and accurately would increase the obedient behavior among workers by three times approximately. To ensure that the workers comply with the regulation, a punishment system can be used for the offenders, and a reward system can be used on those who can perform well. The regulation about the compliance of PPE uses able to give the company capacity to protect occupational safety in the company (21). Delivered by the Head of the Occupational Safety and Health Committee (P2K3) that there had been no response from the company management, and the labor union did not want any sanctions in joint work agreement for their workers who violate the regulation of Occupational Safety and Health (K3).

Aside from the sanctions, health counseling is better conducted routinely because it can increase PPE use practices in company workers. The proper use of PPE will decrease the risk of occupational accidents and maximize worker's health (22).

## Conclusion

Most of the workers (60.5%) have good knowledge about PPE, have a good attitude, and have positive motivation, good supervision, and adequate availability of the PPE. Workers who were less obedient in using PPE by 76.7%. From this study, it can be concluded that there was no significant relationship between knowledge, attitudes, motivation, supervision, and availability with workers' compliance in using Personal Protective Equipment.

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