Urgency Analysis of the Working Environment in the Coating Unit of Metal Industry

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Abstract. Workplace accidents in an industry have caused substantial losses to business owners. If the business owner owns several industries, the losses will be even greater. Therefore, aspects of occupational safety and health (OSH) in the informal industry must be encouraged. Workplace accidents and diseases can be minimized by the presence of OSH in the midst of informal sector workers. The purpose of this study is to analyze the importance of measuring the working environment conditions in the coating unit of metal industry. This research method is descriptive because it does not involve treatment to the respondent. The instruments of this research are equipment to measure noise, work climate, and lighting that are present in the workplace. The questionnaire was used to determine respondents' perceptions related to noise conditions, work climate and lighting in the workplace. The study was conducted in June 2019 in the informal industry in the coating section in both painting and cleaning in metal manufacturing in Sidoarjo. The results of this study are as follows; the work climate is still within normal limits (27.8 ∘C). The average level of general lighting in the painting section is 117 lux and the cleaning section is 81 lux. The lighting is still below the maximum limit (200 lux). The results of noise measurements in the painting section are 78.6 dB and in the cleaning section are 64.0 dB, the figure is still below the threshold value (85 dB). The conclusion in this study is the working climate, lighting, and noise in the respective coatings is still within the safe limits.

Keywords: work climate, noise, lighting

1. Introduction

Workplace accidents in just one industry have caused substantial losses to business owners. If the business owner owns several industries, the losses will be even greater. Therefore, aspects of occupational safety and health (OSH) in the informal industry must be encouraged.

There were 99 small businesses and 54 industries in Waru District which is part of Waru Public Health Center work area in 2011. The number was the highest among Districts in Sidoarjo. Occupational safety and health of small industries' workers is the responsibility of

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the Community Health Center. The small industry group that was the target of the Community Health Center of Waru area was the highest target.

One of the villages in the work area of Waru Community Health Center is Ngingas Village. Ngigas Village is one of Small and Medium Enterprises (SME) center that accommodates 300 entrepreneurs and around 3,000 workers. They produce metal-based products such as motor vehicle spare parts, farming tools, electrical equipment, and other products (Bea Cukai, 2017).

Workplace accidents and diseases can be minimized by the presence of OSH in the midst of informal sector workers. The purpose of this study is to analyze the importance of measuring the working environment conditions in the coating unit in metal industry.

2. Method

This research is a descriptive study because it does not involve treatment to the respondent. The instruments of this research are equipment to measure noise, work climate, and lighting that are present in the workplace. Noise measurement was done using Sound Level Meter from Syantek. Work climate was measured using Heat Stress Apparatus from Questem. The measurement results were then compared with the respective Threshold Limit Value.

The population in this study is amounted to 10 people. The sampling method used total sampling so that we get 10 respondents. The questionnaire was used to determine respondents' perceptions related to noise conditions, work climate and lighting in the workplace.

The study was conducted in June 2019. This study is conducted in the informal industry in coating unit both in painting and cleaning in metal manufacturing in Sidoarjo.

3. Result

The measurement results using equipment to measure the work climate, lighting, and noise showed the results that the working climate is still within normal limits (27.8 ° C), below the threshold of 29° C. The average level of general lighting in the painting section is 117 lux and in the cleaning section is 81 lux, it is still below the maximum limit (200 lux). The results of noise measurements in the painting section are 78.6 dB and in the cleaning section are 64.0 dB, the figure is still below the threshold value (85 dB).

The measurement results of the questionnaire are different from the results of the measurement of the work environment. There are still 3 workers (30%) who feel disturbed by the work climate. There are still 2 workers (20%) who feel disturbed by the noise in the coating unit. For the opinion of respondents related to lighting, they all agree with the results of measurements of the work environment. No respondent felt disturbed by the lighting in the coating unit of metal manufacturing in Sidoarjo. The measurement results are in table 1.

Table 1: Perception of Respondents related to the Work Environment in the Coating Unit of Metal Manufacturing in Sidoarjo in 2019

Work Environment	Feeling Disturbed	
	Yes (%)	No (%)

Work climate	30,00	70,00
Noise	20,00	80,00
Lighting	0,00	100,00

4. Discussion

Work climate represents the combination of work temperature, humidity, airflow and radiation temperature at the workplace. In this study, only work temperature and humidity are measured. Uncomfortable and poor weather of the workplace may decrease work capacity due to decreased work efficiency and productivity (Subaris et al., 2008).

Climate change that has happened exacerbates the health effects of high environmental temperatures on occupational health and safety. Heat stress can contribute to a higher risk of accidents due to work. (Ma et al., 2019). Most respondents in this study felt that their work climate was good. They are comfortable with the conditions which are not too hot or too cold.

Most respondents in the study were in the category of not bothered with lighting in the industry. The lighting system in a workplace building involves many different aspects, especially comfort in vision and health. Light glare can reduce the comfort in vision. In addition, it can also be one of the indirect causes of accidents in the workplace (Sawicki & Wolska, 2019). This shows that enough light has an influence on work accidents.

Noise at the limits in coating material unit is equal to 78.6 dBA in painting section and 64.0 dBA in cleaning section which exceed the maximum limit of 85.0 dBA per 8 hours a day (40 hours per week) as regulated in Minister of Manpower Regulation No. 5 of 2018 on Occupational Health and Safety. This is found in the study done by Pradana (2013), claiming that most workers in Grafity division of PT Dua Kelinci experience intermediate occupational stress due to exposure to noise at 83.5-96.9 dBA generated by production machines.

5. Conclusions

Work climate, noise, and lighting in coating unit are still in safe limits based on the measurements but the perception of few workers is still felt disturbed with work climate and noise of this industry.

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References

[1] Beacukai., 2017. *Bantu Kesulitan Pengusaha Logam Ngingas, Bea Cukai Sidoarjo Kenalkan IKM*. Available from: http://www.beacukai.go.id/berita/bantu-kesulitan-pengusaha-logam-ngingas-bea-cukai-sidoarjo-kenalkan-ikm-.html (accessed 20 Februari 2018)

[2] Ma, R., Zhong, S., Morabito, M., Hajat, S., Xu, Z., He, Y., … Huang, C.. 2019. Estimation of work-related injury and economic burden attributable to heat stress in Guangzhou, China. *Science of The Total Environment*, *666*, 147–154.

[3] Pradana, A,. 2013. Hubungan antara Kebisingan dengan Stres Kerja pada Pekerja bagian Gravity PT. Dua Kelinci. *Unnes Journal of Public Health*; 6(2): 1–9.

[4] Sawicki, D., & Wolska, A., 2019. Objective Assessment of Glare at Outdoor Workplaces. *Building and Environment*, *149*, 537–545.

[5] Subaris, H and Haryono., 2008. Hygiene Lingkungan Kerja. Mitra Cendekia Press. Yogyakarta.