

Analysis of noise in the work system of furniture craftsman

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Abstract

The industrial world is inseparable from technology and the work environment. A work environment that does not meet the requirements will affect the condition of the workforce. Like the work environment that has a noise value of more than the Threshold Limit Value. However, the number of studies on noise intensity in the work system of furniture craftsmen in Indonesia is still limited. This study aims to determine the relationship between noise and Occupational Diseases in a furniture craftsman and provide recommendations for improvement using a hierarchical control approach. This type of research is quantitative with a descriptive approach. The research sample used a furniture craftsman in Bandengan Village, Jepara Regency. Collecting noise intensity data using a sound level meter and examination by an ENT specialist. The results of the doctor's examination showed that the severity of hearing loss in craftsmen was 57 dB while the normal value was 20 dB.

Keywords: Noise Intensity; Hearing Loss; Hierarchy of Control; Occupational Diseases; Furniture Craftsmen

1. Introduction

The industrial world will not be separated from the influence of high technology. Apart from technology, a working environment that does not meet the requirements will affect the health of workers. Such as work environments where noise exceeds the Threshold Limit Value.

He industrial world will not be separated from the influence of high technology [1]. Apart from technology, a working environment that does not meet the requirements will affect the health of workers. Such as work environments where noise exceeds the Threshold Limit Value.

Relevant to this statement, WHO in 2018 stated that noise in the workplace is an important risk factor for hearing loss in workers, accounting for 7% - 21% of hearing loss worldwide [2]

Noise (*Noise Induced Hearing Loss /NIHL*) is deafness due to exposure to loud noise over a long period of time and is usually caused by noisy work environment [3]. If humans are exposed to noise of more than 85 dB for more than 8 hours, it will cause many risks, especially hearing loss. This was proven by the fact that one of the respondents, Mr Sholikin, a furniture craftsman in Jepara Regency, experienced hearing loss.

The furniture business is one of the non-oil and gas companies that has high development potential because the market for wooden furniture products is increasingly attractive, so it is demanded by companies.

Therefore, this study aims to determine the relationship between noise and provide recommendations for improvements to overcome the condition.

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2. Research methods

2.1. Time and place

This research was conducted in December 2022, located in Bandengan Village, Jepara Regency.

2.2. Primary data

The primary data used in this research are interviews and direct observation.

2.3. Secondary Data

Secondary data in this research is that researchers use journals related to noise in work systems.

This research uses several methods, including: (1) Retrospective approach, (2) Doctor's examination, (3) Measurement of noise levels and (4) Risk control in order to provide recommendations for improvement.

A retrospective approach is research that aims to create an objective picture of a situation by looking back or finding out the background of a situation. A retrospective approach was carried out by interviewing craftsmen and other family members related to the craftsmen.

Researchers observing the work systems of furniture craftsmen suspect that craftsmen experience hearing loss or reduced levels of hearing in humans. Craftsmen do not use Personal Protective Equipment (PPE) at all, the noise level of furniture machines has exceeded the Threshold Limit Value, and the level of exposure to noise has exceeded the specified normal threshold. To confirm that there was a suspicion of hearing loss occurring in the craftsmen, the researchers conducted an examination with an ENT specialist.

Then take measurements on each machine used by furniture craftsmen using a tool called a sound level meter.

Risk control using the Hierarchy of Control approach. The control hierarchy is a stage in preventing and controlling risks that may arise which consists of several levels including:

- Elimination
- Substitution
- Engineering Engineering
- Administrative Control
- Personal protective equipment

3. Results and discussion

Based on the results of research conducted on the work system of furniture craftsmen in Bandengan Village, Jepara Regency, after carrying out a retrospective approach by interviewing furniture craftsmen and other family members, it was concluded that the craftsmen had worked for approximately 22 years. Apart from being a craftsman, he once worked for the largest gold company in Indonesia, namely PT. UBS Gold which is located in Surabaya for approximately 3 years.

The work system used by craftsmen is not in accordance with what has been recommended. In other words, not using personal protective equipment at all. The personal protective equipment in question includes earplugs masks and glasses. This tool is useful for reducing the intensity of noise entering the ear.

Therefore, craftsmen are suspected of experiencing hearing problems called *hearing loss* or reduced levels of hearing in the ears. This suspicion arose because when researchers communicated with craftsmen they had to use a large volume of voice, and the communication distance between craftsmen and other people had to be close.

Researchers strengthened this suspicion by examining an ENT specialist. Examinations are carried out to determine the severity of *hearing Loss*

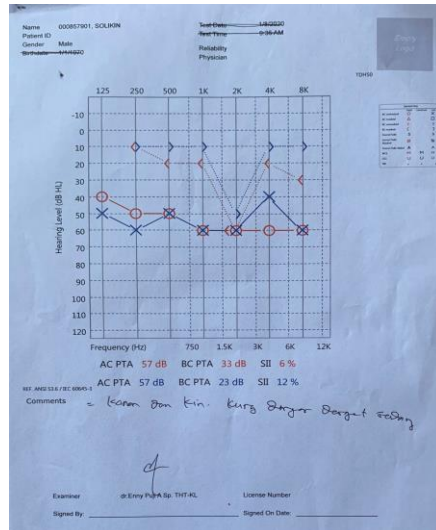


Figure 1 Results of examination by an ENT specialist

From the results of the examination, it was proven that the severity level of the craftsmen was in the moderate category. It is said to be moderate because the value obtained during the examination shows 57 dB, but in normal human conditions the value obtained is around 20 dB.

The doctor also checked the condition of the craftsman's ears, and explained the causes of *hearing loss*. From the examination, the doctor stated that the craftsman often had colds and problems with his nose which caused a hole in his left eardrum. Doctors and researchers suspect that for decades craftsmen have never worn masks to protect their noses from wood splashes produced by furniture machines.

The results of noise level measurements carried out by researchers using a sound level meter are as follows:



Figure 2 Sound Level Meter Measurement Results on the Senso Saw Machine

The results of measurements using a sound level meter show a value of 176.5 dB, if seen from the table of PERMENAKERTRANS No. 13/MEN/X/2011 exposure time using this tool must be less than 0.11 seconds. However, the exposure experienced by craftsmen lasts 8 hours/day so this is very abnormal.



Figure 3 Sound Level Meter Measurement Results on the Bobok machine

The results of measurements using a sound level meter show a value of 100.5 dB, if seen from the table of PERMENAKERTRANS No. 13/MEN/X/2011 exposure time using the tool is between 7.5 - 15 minutes. However, the exposure experienced by craftsmen lasts 8 hours/day so this is not normal.



Figure 4 Sound Level Meter Measurement Results on a Hand Grinding Machine

The results of measurements using a sound level meter show a value of 89.3 dB, if seen from the table of PERMENAKERTRANS No. 13/MEN/X/2011 exposure time using this tool is between 2 - 4 hours. However, the exposure experienced by craftsmen lasts 8 hours/day so this is not normal.

Table 1 Control Hierarchy

Stages	Control
Elimination	No activity can be omitted.
Substitution	Adding employees, to reduce exposure
Engineering Engineering	Using quiet furniture machines
Administrative Control	Provide education on the importance of wearing PPE to Craftsmen Have regular check-ups with an ENT specialist
Personal protective equipment	<i>Earplugs, Masks and Glasses.</i>

The risk control carried out by researchers using a hierarchy of controls in order to provide recommendations for improvements to the work system of furniture craftsmen is as above.

4. Conclusion

From the results of noise analysis research on furniture craftsmen's work systems, it shows that there is a relationship between noise and Occupational Diseases. The noise level of the machines used by furniture craftsmen is measured using a tool called a sound level meter. Apart from that, the researchers also examined an ENT specialist. The inspection results showed that the severity level of the furniture craftsman was in the medium category (57 dB). Therefore, researchers provide recommendations for improvement using a hierarchy of control approach. The risk controls mentioned are as follows: (1) adding employees, in order to reduce the intensity of exposure to noise; (2) use a quiet machine; (3) provide education regarding the importance of using PPE; (4) carry out regular examinations with an ENT specialist; (5) use PPE (mask, *earplugs*, glasses).

Compliance with ethical standards

Disclosure of Conflict of interest

No conflict of interest is to be disclosed.

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