

A Case of Study on Correlation between Age, Noise Level, and Productivity at Barge in Oil Industry

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Abstract. In the industrial environment there are various factors that result in decreasing the productivity, either from the factors themselves or from factors from outside influences. One external factors of influence the productivity of work external influences is the environmental factor is the noise of the work machine, and one factor of the self is one of the wrongly. A worker can work well if supported with a good working environment as well, where a good environment can produce maximum output. So it is necessary to create a system and a good working environment in order to obtain maximum results. Noise is one of pollution that is not desired. Because in the long term noise can interfere with the work of comfort and decrease work; noise can damage the sense of hearing and can cause communication errors. So it is necessary to do the testing at the noise level, among others, aged between 40-60 db, 61-80 db, 81-100 db. This research focuses on cabin control process in CT Packer's interviews installation is the tool that is inserted into the production well. This is done to determine the effect or relationship between age and noise on the productivity of workers, performance level the performance of operators on the cabin control process and also on the level of how the operator can do the job comfortably and optimally. After analyzing the data, the results showed that the noise level of, aged between 40-60 db bothered a comfortable and optimum workspace condition with total working time of 2186 minutes or 36.4 hours from all operators totaling 16 people working. And after conducting a correlation test, at the noise level, aged between 40-60 db has the nature of weak eyes relationship between age and noise to work productivity with positive correlation.

Keywords: Noise, age, product moment Pearson correlation

1. Introduction

1.1. The Background

The noise is unwanted sound all that flowed from the instruments of the production process and/or the tools that work on a certain level can cause hearing disorders.(Regulation of the Minister of Manpower and Transmigration Number Per.13/De/X/2011 2011). The noise affect the hearing organ of Corti in cochlear implants especially hair cells. The first area affected is the outer hair cells that indicate increased degeneration in accordance with the intensity and long exposure. Stereo cilia on hair cells outside became less rigid so that reduce the response to stimulation. By increasing the intensity and the duration of exposure will be found more damage such as the loss of stereo cilia. The first area affected is the basal area. With the loss of stereo cilia, hair cells died and were replaced by fibrosis tissue. The higher the intensity of the sound exposure, the cells in the hair cells and supporting cells are also damaged. With the more the extent of the damage to the hair cells, can



arise degeneration on the nervous system also can be found in the nucleus of hearing in the trunk of the brain. Dobie (2011) also said that with continuously exposed to the noise so it will cause both. [1] [2] [3]

1.2. Problem formulation

Based on the explanation above then problems are formulated to the requirements of time to operate the *control Cabin*, on how level of noise that operators could still produce output optimal performance, and how many the installation of the CT Packer's interviews that can be done by workers with each and every noise levels.

1.3. The aims of the Research

1. Determine the time required to operate the control Cabin.
2. Know the value of the minimum and maximum noise level from the voice of the unit in the location of the work.
3. Determine the noise level operator that can produce output optimal performance.
4. Know the value of the correlation between the internal factors (age) and external factors (noise) against the productivity of labors at the company.

2. Literature Review

2.1. The Noise

The noise is unwanted sound all that flowed from the instruments of the production process and/or the tools that work on a certain level can cause hearing disorders. Noise threshold value is 85 dB for 8 hours daily and 40 hours a week can still be accepted without workers has resulted in a reduction of health. In addition, for every noise that caused both are continuously, impulsive or intermittent does not exceed the limit of 140 dB (Ceiling point). When the limit exceeds it will cause health risk for workers such as hearing loss due to noise (PT Noise Hearing Loss) or NIHL. (Regulation of the Minister of Manpower and Transmigration Number Per.13/De/X/2011 2011) and Transmigration Number Per.13/De/X/2011 2011). In the workplace, great potential to create and increase the severity of the noise level [4] [5] [6].

2.2. Hearing disorders

According to Tjan et al (2013), there is a meaningful relationship between hearing disorders with noise intensity while there are the influence between the intensity noise against the degree of hearing disorders and there is also the influence between long live against the degree of hearing disorders. The noise is avoided by anyone, more and more in implementing a work because the concentration of workers will be disturbed so that the work done will be many arise an error or damage that will cause loss (Anizar, 2012) [7] [8].

According to Setyanto et al (2011), in the research stated that the noise level factor gives a very great influence on the job completion [9] [10].

The high noise exposure can affect the value of the threshold heard a man. Students with noise exposure 100-105 dB, there is the influence of the noise exposure to the threshold of hearing [11] [12] [13].

2.3. Genesis Relationship between Noise Level and hearing disorders

In 2010 reported cases hearing disorders due to the noise in Korea for 18 years until 2007. From the report obtained data drop in the case of hearing disorders from the most high as much as 311 (23.4%) cases in 1992 until 237 (2.1%) cases in 2007. Noise level from the year 2002-2005 in working environment showed at least changes in noise exposure assessment that exceeds the threshold. Conducted research in India on hearing disorders relationship with the comparison frequency between the frequency of speaking and frequency 4000 Hz [14] [15] [16].

The frequency of speaking is a term that represents the ability to hear the man with the value of the threshold between 500 Hz, 1000 Hz and 2000 Hz. The results of research mentioned that from 50

workers exposed to the noise there are 80 percent of workers experiencing hearing loss at the frequency of less than 4000 Hz (*speech frequency*) (Tekriwal, 2011) [17][18].

2.4. Framework

1. The identification of the problem and determine the Theme
2. Analysis of the existing condition and cause
3. Data search
4. To get the results from the research

3. Research Method

3.1. Research Object

The subject of the research is on the age of the workers and the noise of the appliance work, objects that want to in detail is to know the value of the correlation between the external and internal factor of productivity in the company.

3.2. The Research location and timeframe

This research conducted in working location namely own barge sea heaven 6 in Mahakam block in East Kalimantan. This research was conducted in a timeframe of February– July 2017.

3.3. The preparation stage

1. Do the licensing process to conduct research into of the company.
2. Doing lending processes tools that will be used in this research to the company. The appliance will be in interlibrary loan is a *Sound newly meters* (SLM) to measure the noise level.
3. Ask the results of medical checkup the workers to know the situation or health conditions of hearing the last 2 years
4. Make schedule settings from the beginning of research activities started until the reporting
5. Process for accountability research.

3.4. Collection of data on the characteristics of Workers

The collection of data related to the characteristics of workers is done with the interview. Charging the interview filled by workers after obtaining a medical checkup.

3.5. Data Processing

After doing good data collection process any primary or secondary next process is the process of data processing. To obtain the raw material from the settlement of each element of the work in the complete steps as follows:

3.6. Testing the uniformity of Data

1. To perform test of uniformity of the data we first perform the following steps:
2. Calculate the price average (internal factors & external factors) from the data that are acquired through the collection of data.
3. Calculate standards deviation.
4. Test the uniformity of data.

3.7. Testing the adequacy of Data

Where data in say enough when the result $N'' < N$, when $N'' > N$ then need to perform the measurement of the second stage to get some ata again. Then i do the testing uniformity and The adequacy of Data until found the value of $N'' < N$.

4. Results and Analysis

4.1. Work Location

Researchers using the Sound level meters in the measurement of the value of the voice of the machine work, measured with the duration of the ten minutes and every thirty seconds in the paper as data so that it can know the value of the minimum and maximum noise in the field. From the measurement result in find the value as follows:

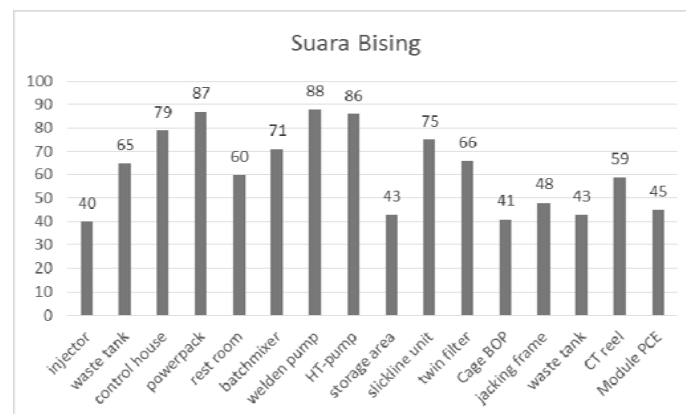


Figure 1. The value of the noise in the Work Area
(Source: the measurement results in the field)

Table 1. Supporters of Control Cabin
(Source: location Area work own barge sea heaven 6)

No.	The appliance work	No.	The appliance work
1	Positioned	6	Mixer Batch
2	The waste tank	7	Welden pump
3	Control house	8	HT 400 pump
4	Power pack	9	Storage area
5	Office / rest room	10	Slick line the unit

4.2. Analysis of the age of the relationship and the noise of the Work Performance

The recording of the time in need the operators control cabin in the process of mounting work CT Packer's interviews from each of the noise level, aged between 40-60 db, 61-80 and 81-100 db. Based on data processing from the previous chapter, in research done on every noise level there was a difference in the output of the unit in the produce of every noise level. From the results of the calculation in previously that we found the following results:

1. On noise level 81-100 db time in need in pairing CT Packer's interviews using the control cabin is 2350 minutes or 39.1 hours.
2. On noise level 61-80 db time in need in pairing CT Packer's interviews using the control cabin is 2330 minutes or 38.8 hours.
3. On noise level, aged between 40-60 db time in need in pairing CT Packer's interviews using the control cabin is 2186 minutes or 36.4 hours.

Thus the noise level, between 40-60 db in pairing CT Packer's interviews shorter than on the noise level db and db 81-100 61-80. This means that the noise level, between 40-60 db work performance is higher than the two other noise level. On noise level db 61-80 operator work a little more quickly so quickly fatigue and concentration of the operator is declining possibly due to noise resulted by the hearing operator so that tend to make a mistake. While on the noise level db 81-100 operator work more quickly so that the cause of fatigue that fast again and quickly decrease the concentration of the operator so often make the mistake. The views of the operators' feeling that see strange women, and complaining about dizziness, and also the heart of the home grown tightly.

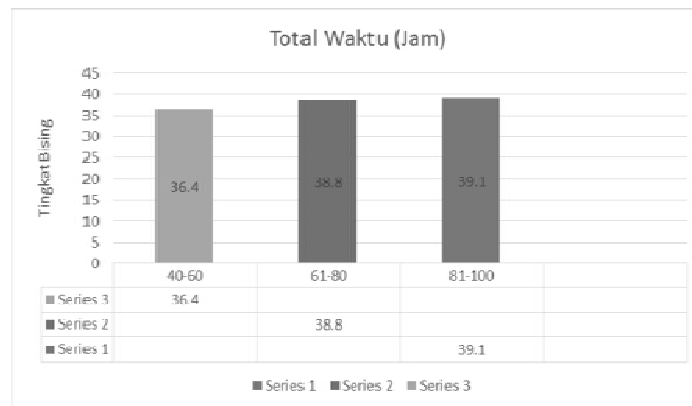


Figure 2. Chart noise level against Time

Based on the first of the time that has been shown by the result, it can be set as reference in the pairing process CT Packer's interviews with using the control cabin in 1 project wells. The following table will be acquired if refers to from the chart if in compare the data that 30 days is 720 hours.

Table 2. Pairing CT Packer's interviews in Produce

No.	CT Packer's interviews that will produce					
1	40-60 db		61-80 db		Db 81-100	
2	36.	4	38.8		39.1	hours
3	19	CT	18	CT	18	CT
	Packer's		Packer's		Packer's	
	interviews		interviews		interviews	

4.3. Pearson Correlation Test

To know there is or is not his relationship between age and the noise of the work performance, researchers test correlation with the calculation of the statistic parameters Pearson.

1. Noise level db 81-100, $R = -0.08$
 - a. If r count of $-0.08 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.
 - b. See the value of negative correlation coefficient (-0.08) means that if the value of the variable age decreased the performance will rise, the relationship between the two
 - c. variables have very weak correlation.
2. Noise level db 61-100, $R = -0.1$
 - a. If r count of $-0.1 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.
 - b. See the value of negative correlation coefficient (-0.09) means that if the value of the variable age decreased the performance will rise, the relationship between the two variables have very weak correlation.
3. Noise level, aged between 40-60 db, $R = 0.21$
 - a. If r count of $0.21 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.

- b. See the value of positive correlation coefficient (0.21) means that if the value of the variable age up the performance will rise, the relationship between the two variables has weak correlation.

After performing the calculation of correlation tests from each noise level with the age of the workers, all results concludes there is no relationship between age and the noise on the performance of the workers.

Because the H_0 in thank then, there is no difference between the influence of the noise and the age of the number of the output in the produce on the installation of the CT Packer's interviews against the research results in complete.

4.4. Calculating the correlation between Multiple

Multiple correlation coefficient is used to know the level of or the degree of the relationship to more than one free variable fruit. Based on the multiple correlation coefficients can be in the know large percentage of strong relations between the variables variable. The form of multiple linear regression to Y over X_1, X_2 namely $Y = \alpha_0 + \alpha_1 X_1 + \alpha_2 X_2 \dots \dots \dots \alpha_k X_k$

Based on the results of the calculations in obtain :

- The simple correlation coefficient between Y and X_1^2 namely $r_{yx1} = -0.02$
- The simple correlation coefficient between Y and X_2^2 namely $r_{yx2} = -0.42$
- The simple correlation coefficient between x_1 and x_2 namely $r_{x1x2} = 0.03$

4.5. Level of trust in the Age of the workers and the noise of the productivity of labor in Own Barge 123 of the company

Based on the value of the significance of the results of the output SPSS

- In the table above the value of Sig. variable age (X_1) = 0.950 > 0.05 so H_0 in decline, which means independent variable age partially does not have positive and significant impact on the variable productivity (Y).
- In the table above the value of Sig. noise variables (X_2) = 0.116 > 0.05 deeply H_0 in decline, which means the noise independent variables partially not significant effect against productivities (Y).

5. Conclusion and Suggestions

5.1. Conclusion

1. From each process work in take as much data 16 data on every noise level during three times with different day, after in doing calculations on the data in the know that the data has been uniform and is located on the border control.

The results of the time in can in 1 times the installation CT Packer's interviews on every noise level as follows:

- a. On noise level 81-100 db time in need in pairing CT Packer's interviews using the control cabin is 2350 minutes or 39.1 hours.
 - b. On noise level 61-80 db time in need in pairing CT Packer's interviews using the control cabin is 2330 minutes or 38.8 hours.
 - c. On noise level, aged between 40-60 db time in need in pairing CT Packer's interviews using the control cabin is 2186 minutes or 36.4 hours.
2. The measurement result in find the value of the lowest sound namely 40db and highest 88db. The noise level in detail includes 3 levels, namely: 40-60db, 61-80db, 81-100db in operating control cabin.
 3. On noise level, aged between 40-60 db in pairing CT Packer's interviews shorter than on the noise level db and db 81-100 61-80. This means that the noise level, aged between 40-60 db work performance is higher than the two other noise level

4. After performing the calculation of the partial correlation tests between the age of the workers, noise level of productivity in the find results :

Noise level db 81-100, $R = -0.08$

- a. If r count of $-0.08 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.
- b. See the value of negative correlation coefficient (-0.08) means that if the value of the variable age decreased the performance will rise, the relationship between the two variables have very weak correlation.

Noise level db 61-100, $R = -0.1$

- a. If r count of $-0.1 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.
- b. See the value of negative correlation coefficient (-0.09) means that if the value of the variable age decreased the performance will rise, the relationship between the two variables have correlation very weak.

Noise level, aged between 40-60 db, $R = 0.21$

- a. If r count of $0.21 < r$ table (see table r with $n=16$ degree trust 5 percent (0.426) then H_0 in received so that there is no relationship between the value of the age and the noise on the performance of the employees.
- b. See the value of positive correlation coefficient (0.21) means that if the value of the variable age up the performance will rise, the relationship between the two variables has weak correlation.

The simple correlation coefficient between Y and X_1^2 namely $r_{yx1} = -0.02$. The simple correlation coefficient between Y and X_2^2 namely $r_{yx2} = -0.42$. Multiple correlation coefficient namely $R_{yx1x2} = 0.442$. The value of the significance obtained is 0.116.

5.2. Recommendation

1. After doing research on the installation CT Packer's interviews, it is suggested in replacing CT Packer's interviews in create noise mapping, in order to provide additional information to workers that they are located in areas that are vulnerable to the decrease in the quality of hearing.
2. The company should make good planning in providing additional skills to workers about peace in the work in the area of the noise, hope if workers have tranquility to expect productivity will be better.
3. Existing facilities existing in the area of control cabin is now almost all parts have been good enough. But the desk in feel less than optimal since in doing research the placement of components is not a maximum.
4. Additional research to doing to search other factors other than the age factors, such as factor fatigue or fatigue workers. So the factor that causes the performance degradation can be identified.

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