

## THE RELATIONSHIP BETWEEN AGE AND WORKING PERIOD WITH JOB FATIGUE IN PERMANENT WORKERS AT THE PURWODADI MAGETAN SUGAR FACTORY

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### ABSTRACT

*Work fatigue is one of the crucial issues that needs to be addressed because fatigue can cause work skills to disappear, health conditions decrease so that it can trigger work accidents, as well as decreased productivity and work performance. The purpose of this study was to determine the relationship between age and length of service with work fatigue in permanent workers of the Purwodadi Magetan sugar factory. This type of research is quantitative with a cross sectional approach. The sampling technique uses random sampling, the population in this study were permanent workers at the Purwodadi Magetan Sugar Factory which amounted to 129 workers, the number of samples in this study were 56 respondents. Data analysis test in this study is to use Chi Square. The results of this study indicate that there is a relationship between age and work fatigue with the results of  $p = 0.042 < 0.05$ , there is a relationship between tenure with work fatigue with the results of  $p = 0.026 < 0.05$ . Based on the conclusions and suggestions of the research results that there is a significant relationship between age, length of service with fatigue. The suggestion of the research is that Purwodadi Sugar Factory Magetan can make efforts to control fatigue caused by age, length of service.*

### KEYWORDS

Age, Working Period, and Work Fatigue



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### INTRODUCTION

Occupational fatigue is one of the issues related to health and safety at work. Occupational fatigue will reduce performance and increase work errors. If workers' performance decreases due to physical or mental fatigue, the company will

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experience a decrease in work productivity as a result. In addition, other long-term impacts such as occupational diseases and work accidents may also arise.

According to the *World Health Organization* (WHO), severe fatigue is the second most dangerous health problem after heart disease. The study was conducted by the Japanese Ministry of Labor involving around 16,000 randomly selected employees. The results proved that 65% of employees complained of physical fatigue due to daily work, 28% complained of mental fatigue, and 7% complained of stress and feeling left out. A study conducted in one of Indonesia's production departments found that the average worker experienced back pain, headaches, and stiffness in the shoulders (Anita Rahmiwati, 2018).

Work fatigue can occur in every situation in the company, both superiors and subordinates, staff and leaders. For every employee, difficulties can be used as a heavy burden in their work, for example in delivery workers who mostly work in the field dealing with any situation, office workers who drain a lot of brains in completing their work, and also the competitiveness between workers is increasing and the attitude between superiors and subordinates.

According to the Transportation Fatigue Risk Management System for Development and Implementation, Canda (2007), long-term fatigue syndrome can occur if fatigue does not go away in more than six months and is accompanied by other symptoms. The syndrome can be caused by a variety of work-related issues, such as working time, shifts, workload, rest periods, and workplace environment, as well as non-work-related issues (Nadia, 2011).

Factors that can affect a worker's fatigue level include age, length of service, and nutritional status. Due to the decline in muscle strength at the age of 40 to 50 years, older people will experience fatigue faster than younger workers. Length of service is the amount of time an employee spends working for a company. The risk of health problems increases with length of employment. At PT Nobelindo Sidoarjo, a strong relationship between fatigue and working time was found in a study conducted by Adam Suryaatmaja on the Relationship between Working Period, Workload, Noise Intensity with Work Fatigue at PT Nobelindo Sidoarjo in 2020 (Suryaatmaja, 2020).

In 2022, Yustika Rusila conducted a study on the relationship between age, tenure, and physical workload with worker fatigue at the Subur and Sahara cracker factories in Yogyakarta. The study found that 12 respondents (37.5%) experienced enormous fatigue while working, as a result of heavy workload. In addition, employees manually moved production materials to the next process or stage. Most employees work by standing, bending and walking. Workers are tired because of the way they work and the heavy workload results in workers experiencing fatigue while working and experiencing muscle pain in the legs, back, and neck (Yustika Rusila, 2022).

Based on interviews with workers at Purwodadi Sugar Factory and in the HR department, working time is from 08.00 to 16.00, with a break at 12.00 to 13.00, with six working days without shifts. Based on interviews with 10 permanent workers, using a questionnaire. Based on the results of the initial study conducted, it was found that 3 workers often felt heavy in the head, 6 workers often felt tired throughout the body, 4 workers rarely felt heavy in the legs, 5 respondents often felt a burden on the eyes, 2 workers very often lacked confidence, 2 workers often felt stiff in the shoulders, 5 workers often felt thirsty, 2 workers felt frequent dizziness.

Controls to reduce work fatigue by making good use of existing rest periods, providing supplements or milk to employees once a month to maintain stamina and increase enthusiasm, doing gymnastics together at an uncertain time so that employees do not feel tired, and creating an environment where employees gather to reduce fatigue.

This study aims to determine the relationship between age and tenure with job fatigue among permanent workers at Purwodadi Sugar Factory in Magetan. Specifically, this study identifies the age of permanent workers, their tenure, and their level of job fatigue. In addition, this study also analyzed the relationship between age and occupational fatigue, as well as the relationship between tenure and occupational fatigue in permanent workers at Purwodadi Sugar Factory in Magetan.

Through this research, the author can apply theory and real practice that can increase knowledge and experience in the field of occupational safety and health (K3). For STIKES Bhakti Husada Mulia Madiun, this research is expected to provide a better understanding of the application of public health science, especially regarding the relationship between age and tenure with job fatigue in permanent workers at the Purwodadi Magetan Sugar Factory. Meanwhile, for the Purwodadi Magetan Sugar Factory, the results of this study can be an evaluation material for the company in overcoming the problem of fatigue in employees, so as to improve the welfare and productivity of the workforce.

## **RESEARCH METHOD**

The research method used is quantitative research with a *Cross Sectional* approach to determine the factors associated with work fatigue in permanent workers at the Purwodadi Sugar Factory in Magetan. This research began in March to August 2024. The population studied was all permanent workers at the Purwodadi Magetan Sugar Factory which amounted to 129 workers. To determine the sample size in this study using the Slovin formula, as follows:

$$n = \frac{N1 + N(d)^2}{2}$$

Description:

n: Sample size

N: Total population

d: Kostanta = 0.1, which is the deviation from the population or the desired degree of precision of 0.1.

Based on the formula above, the sample size is obtained:

$$n = \frac{N1 + N(d)^2}{2}$$

$$n = \frac{1291 + 129(0,1)^2}{2}$$

$$n = 1292,29$$

$$n = 56,33$$

$$n = 56$$

The method of collecting samples for this study uses *Simple Random Sampling*. In this study researchers used Microsoft Excel in *Random Samling*. In this study researchers used *Microsoft Excel* in *Random Samling*, in the following way:

1. Create a list of names of permanent workers at Purwodadi Sugar Factory in excel
2. Grouping names according to their
3. Program excel for random sampling
4. Sorting data using random numbers to reorder the results obtained.

The variables used in this study are a) Independent Variable and Dependent Variable.

**Table 1. Operational Definition**

No.	Variables Operational Definition	Parameters	Measurement Tools	Scale	Category
<b>Dependent Variable</b>					
1.	Fatigue	The results of the calculation of the total score of fatigue in permanent workers at the Purwodadi Magetan sugar factory based on the IFRC questionnaire.	Workers are said to experience fatigue if symptoms such as headaches, stiff shoulders, back pain, shortness of breath, thirst, hoarseness, dizziness, heavy eyelids, trembling	Interview using the IFRC questionnaire	Nominal 1= Tired 2= Not Tired  With notes: The score is said to be tired if the total score is

			in certain parts of the body and feeling unwell. Workers are said not to experience fatigue if they do not feel these symptoms.			45-90 is said to be Tired if the score is 0-44  (Tarwaka, 2014).
No.	Variables	Operational Definition	Parameters	Measurement Tools	Scale	Category
<b>Independent variable</b>						
1.	Ag	The length of life of the respondents studied was calculated from the time of birth until the interview was conducted. Judging from the respondent's personal identity.	According to the Ministry of Health in 2009 1. Elderly period: 46 years - 65 years 2. Adulthood: 18 years - 45	Interview using questionnaire	Nominal	1 = Elderly
2.	Length of	The length of time workers work at the Purwodadi Magetan Sugar Factory. Based on data owned by the company.	According to MA Tulus (1994) categorized (Suma'mur, 2014): 1=long $\geq 10$ 2= new $< 10$ Years	Interview using questionnaire	Nominal	Old New

Source: Author's Data

Data collection techniques in this study conducted interviews with employees using questionnaires on permanent workers at the Purwodadi Magetan Sugar Factory and the questionnaire in this study used a standardized type of questionnaire using the Japanese Industrial Fatigue Research Committee (IFRC), which is one of the questionnaires that has the ability to measure work fatigue subjectively consisting of 30 questions. After the information is collected, it is then systematically analyzed and displayed in a cross tabulation that combines the independent and dependent variables. The following are the techniques used in analyzing the data of this study with univariate analysis and Bivariate Analysis.

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## RESULT AND DISCUSSION

### Research Results

#### *Overview of Purwodadi Sugar Factory*

PTPN XI PG POERWODADIE located in Pelem Village, Karangrejo, Magetan Regency, East Java. Purwodadi sugar factory is one of the units that produces the main product in the form of sugar under the auspices of PT Perkebunan Nusantara XI. In the process of sugar production which aims to meet the national demand for sugar. PTPN XI PG POERWODADIE located in Pelem Village, Karangrejo, Magetan Regency, East Java. The boundaries of the purwodadi Magetan sugar factory area.

- a. East side: Sugar cane storage
- b. West side: Employee and guest parking lot
- c. North: Sugarcane weighing station
- d. South: Production site and warehouse



**Figure 1: Location of Purwodadi Sugar Factory**

Source: Secondary Data, 2024

#### 1. Number of Employees of Prwodadi Sugar Factory

**Table 2. Number of employees at Purwodadi Magetan Factory**

No o	formation	Total h
1.	employees	129
2.	employees	81

Source: Primary Data, 2024

Based on Table 1, it can be seen that the number of employees in Pabri Purwodadi Magetan is divided into 2, namely permanent employees with a total of 129 employees and seasonal employees with a total of 81 employees.

### Univariate Analysis Results

The following are the results of univariate analysis on permanent workers at Purwodadi Sugar Factory Magetan:

#### 1. Variable

The Age variable is grouped into two, namely Elderly and Adult, the frequency distribution of the Age variable is shown in the following table:

**Table 3. Frequency Distribution Based on Age Variables**

No.	Ag	Frequency	Percentag
1.	Elderly (46-65 years old)	26	46,4
2.	Adults (18-45 years old)	30	53,6
	Total	56	100

Source: Primary Data, 2024

Based on Table 3, it can be seen that the elderly are 26 respondents (46.4%) and adults are 30 respondents (53.6%).

#### 2. Tenure Variable

The Working Period variable is grouped into two, namely old and new, the frequency distribution of the Working Period variable is shown in the following table:

**Table 4. Frequency Distribution Based on Tenure Variable**

No.	Length of Service	Frequenc	Percentag
1.	Lama	41	73,2
2.	New	15	26,8
	Total	56	100

Source: Primary Data, 2024

Based on Table 4, it can be seen that the old working period is 41 respondents (73.2%) and the new working period is 15 respondents (26.8%).

#### 3. fatigue variable

The Work Fatigue variable is grouped into two, namely tired and not tired, the frequency distribution of the Workload variable is shown in the following table:

**Table 5. Frequency Distribution Based on Workload Variable**

No.	Work Fatigue	Frequency	Percentag
1.	Tired	34	60,7
2.	Not Tired	22	39,3
	Total	56	100

Source: Primary Data, 2024

Based on Table 5, it can be seen that Work Fatigue in the tired category is 34 respondents (60.7%), Work Fatigue in the not tired category is 22 respondents (39.3%).

### Bivariate Analysis Results

1. Relationship between Age and Work Fatigue in Permanent Workers at Purwodadi Sugar Factory

**Table 6. Relationship between Age and Work Fatigue**

Ag	Work Fatigue				Total		Value <i>P</i>	RP (95%CI)
	Tired		Not Tired					
	N	%	N	%	N	%		
Elderly	20	76,9	6	23,1	26	100,0	0.042	3,810 (1,194- 12,158)
Adults	14	46,7	16	53,3	30	100,0		

Source: Primary Data, 2024

Based on table 6 above, it can be seen that the age of workers in the Elderly category who experience fatigue as many as 20 people (76.9%) while for the adult category who experience fatigue as many as 14 people (46.7%). The results of the chi-square test analysis of the relationship between age and fatigue in workers showed the result of  $p = 0.042 < 0.05$ . So it can be concluded that statistically there is a relationship between age and fatigue. The results of the analysis obtained the value of  $RP = 3.810$  which means that respondents with age categories are at risk of fatigue 3.810 times.

2. The Relationship of Working Period with Work Fatigue in Permanent Workers at Purwodadi Sugar Factory

**Table 7. Relationship between tenure and work fatigue**

Length of	Work Fatigue				Total		Value <i>P</i>	RP (95%CL)
	Tired		Not Tired					
	N	%	N	%	N	%		
Lama	29	70,7	12	29,3	41	100,0	0.026	4,833
New	5	33,3	10	66,7	15	100,0		(1,362- 17,156)

Source: Primary Data, 2024

Based on table 7 above, it can be seen that the working period of old category workers who experienced fatigue was 29 people (70.7%) while for the new category who experienced fatigue was 5 people (33.3%). The results of the chi-square test analysis of the relationship between tenure and fatigue in workers showed the result of  $p = 0.026 < 0.05$ . So it can be concluded that statistically there is a relationship between tenure and fatigue. The results of the analysis obtained the value of  $RP = 4.833$  which means that the working period is at risk of fatigue 4.833 times.

## Discussion

### *Age Variable*

Based on the results of the analysis to determine the age variable in permanent workers at the Purwodadi Sugar Factory in Magetan. Based on the elderly age category as many as 26 people, while for the adult category as many as 30 people. The older a person is, the more his energy needs decrease. In general, muscle work ability is increasingly according to old age, especially in those who are heavy workers. Physical capacities of the workforce such as vision, hearing and reaction speed tend to decline after the age of 30 years or more. This can affect the maximum productivity of the workforce and tend to feel fatigue more quickly.

Based on research conducted by Hikma Nur Afiah Sali, 2023 related to the effect of age and tenure on employee productivity at pt. maruki international indonesia, if there is an increase in the age variable, it will be followed by a decrease in work productivity. which means that if there is an increase in the age variable, it will be followed by a decrease in work productivity.

Based on the research above, it is concluded that the employee age variable affects employee work productivity, meaning that the higher the age, the lower the employee's work productivity.

### *Tenure Variable*

Based on the results of the analysis to determine the age variable in permanent workers at the Purwodadi Sugar Factory in Magetan. Based on the old working period category as many as 41 people, while for the new working period category as many as 15 people. The length of service can affect workers both positively and negatively. The positive impact of a long working period is that the longer a person works, the more experience they have. The negative impact of a long working period is that it can cause fatigue and boredom at work. According to (Simanjuntak, 1985) that one of the determining factors in increasing employee productivity is the employee's work experience in carrying out the assigned tasks. For extensive work experience, a longer working period is required.

Based on research conducted by Hikma Nur Afiah Sali, 2023 related to the effect of age and tenure on employee work productivity at pt. maruki international indonesia, if there is an increase in the tenure variable, it will be followed by an increase in employee work productivity. According to research by Eben Tua Pandapotan (2013) that tenure has a significant effect on work productivity. This means that the longer the employee's tenure, the higher the productivity will be, while the short tenure, the lower the work productivity.

Based on the research above, it is concluded that the tenure variable is stated to have a significant positive effect on employee productivity, meaning that the longer the employee's tenure, meaning that his work experience is higher, it will result in higher work productivity.

### ***Work Fatigue Variable***

Based on the results of the analysis to determine the variable of job fatigue in permanent workers at Purwodadi Sugar Factory Magetan. Based on the category of work fatigue tired category as many as 34 people, while for the category of work fatigue category not tired as many as 22 people.

Occupational fatigue is a group of symptoms associated with decreased alertness, work capacity and efficiency, skills, motivation and increased anxiety or boredom that can result in increased work errors, absenteeism, quitting, work accidents, and decreased work productivity (Grandjean, 1985).

Based on research conducted by Kimberly Febrina Kodra, 2022 related to the relationship between fatigue and labor productivity of PT X Medan palm oil mill, the higher the fatigue, the lower the labor productivity. Conversely, the lower the fatigue, the higher the labor productivity. This means that there is a significant negative relationship between fatigue and labor productivity. To achieve optimal productivity, it is necessary to set the right rest time, as well as increase the knowledge of work nutrition managers through training on work nutrition.

Based on the above research, it is concluded that the workload variable states that the higher the work fatigue, the lower the labor productivity, and vice versa, the lower the work fatigue, the higher the labor productivity.

### ***Relationship Between Age Variables With Work Fatigue***

Based on the results of bivariate analysis using statistical tests using the chi-square test with the aim of knowing whether there is a relationship between age variables and work fatigue in permanent workers at the Purwodadi Sugar Factory in Magetan. Based on the age category of the elderly who experience work fatigue as many as 20 people, in the elderly category more who experience work fatigue because the elderly age of workers greatly affects fatigue while working because the excess work capacity is not in accordance with their physical condition, on the

other hand in old age various health problems associated with degenerative diseases that can interfere with work often cause fatigue, while for the adult category who experience work fatigue as many as 14 people, in the adult age category fewer who experience work fatigue because there are some who are not accustomed to the work given and not too many task demands. The results of the chi-square test analysis of the relationship between age and fatigue in workers showed the result of  $p = 0.042 < 0.05$ . So it can be concluded that statistically there is a relationship between age and fatigue.

There is a relationship between age and work fatigue in permanent workers at the Purwodadi Magetan Sugar Factory in accordance with the theory of Suma'mur, 2014 which states that the older a person is, the lower his energy needs. In general, muscle work ability is increasingly according to old age, especially in those who are heavy workers. The physical capacity of labor such as vision, hearing and reaction speed tends to decline after the age of 30 years or more. This can affect the maximum productivity of workers and tend to feel fatigue more quickly. Similarly, the shorter the sleep time and the more difficult it is to sleep. The first complaints are usually felt at the age of 35 years and the level of complaints continues to increase with age. This happens because in middle age, muscle strength and endurance begin to decline so that the risk of muscle complaints increases.

This is also in line with research conducted by Edwina Rudyarti, 2020 related to analyzing the relationship between work stress, age, tenure and work climate with feelings of job burnout in nurses. Increasing age will be followed by organ degeneration so that the organ's ability decreases. In old age the level of work ability is less because the physical condition decreases, causing fatigue faster while in younger workers the physical condition is still good so that they can work with a higher capacity.

Based on the research, it can be concluded that with the age of the elderly, the risk of experiencing work fatigue is very high compared to adulthood due to physical capacity that begins to decline, it should be to reduce the effect that workers must do something in accordance with the body's capacity and provide tasks according to their individual abilities to avoid excessive work fatigue.

### **Relationship between Working Period Variables and Work Fatigue**

Based on the results of bivariate analysis using statistical tests using the chi-square test with the aim of knowing whether there is a relationship between the variable Working Period with job fatigue in permanent workers at Purwodadi Sugar Factory Magetan. Based on the length of service in the old category who experienced fatigue as many as 29 people. In the old working period category, more people experienced work fatigue due to the work they had done every day so they felt bored and while for the new working period who experienced work fatigue as many as 5 people. In the new tenure category fewer experience job burnout because

they feel unburdened. The results of the chi-square test analysis of the relationship between tenure and job fatigue in workers showed the result of  $p = 0.026 < 0.05$ . So it can be concluded that statistically there is a relationship between tenure and job fatigue.

The existence of a relationship between tenure and fatigue in permanent workers at the Purwodadi Magetan Sugar Factory is in accordance with the theory of Suma'mur, 2014, which states that the negative effect if a worker has a long working period can cause fatigue and boredom in monotonous work activities and this can affect the state of the working muscles. In addition, having a long working period will affect the stamina of the worker's body, so that it can reduce the worker's endurance.

This is also in line with research conducted by Yustika Rusila, 2022 related to the relationship between age, tenure and physical workload with work fatigue in workers at the fertile cracker factory and the sahara cracker factory in Yogyakarta. The working period is related to the adaptability between workers and their work and work environment. The adaptation process can have a positive effect that can reduce tension and increase activity or work performance, while the negative effect is the limit of excessive body resistance due to the pressure obtained in the work process. This is the cause of work fatigue which leads to a decrease in psychological and physiological functions. physical pressure at a certain time will cause a decrease in muscle performance, the symptoms shown are in the form of slow movements, this is not only caused by heavy workloads but rather the pressure that accumulates every day for a long period of time.

Based on the research, it can be concluded that a longer working period has a risk of experiencing fatigue than those who have just worked. Respondents who experience fatigue, but are still in the new work period category, can also be caused by high workloads and non-ergonomic work attitudes.

## CONCLUSION

Based on the results of research on factors related to work fatigue in permanent workers at the Purwodadi Sugar Factory in Magetan, it can be concluded that the age factor affects work fatigue, where as many as 20 elderly workers experience work fatigue. In addition, the working period factor also affects job fatigue, with 29 workers who have a long working period experiencing job fatigue. Overall, most of the permanent workers at Purwodadi Sugar Factory in Magetan experienced high levels of job fatigue, with 34 workers experiencing job fatigue. From the results of the analysis, it was found that there was a relationship between age and the level of job fatigue in permanent workers at Purwodadi Sugar Factory in Magetan. In addition, there is also a relationship between the length of service

with the level of fatigue in permanent workers at Purwodadi Sugar Factory Magetan.

For companies, it is recommended to reduce the workload and responsibilities for older workers to reduce their fatigue levels. In addition, workers with more recent tenure can be given more responsibilities and work that suits their capacity. With this research, it is hoped that companies will be able to implement strategic measures to address fatigue in workers and adjust tasks or responsibilities according to the individual abilities of each worker. The company is also advised to implement a policy that encourages workers who are unwell to rest to restore their physical condition, whether in mild or severe illness. For STIKES Bhakti Husada Mulia Madiun, the results of this study can be used as an academic reference and add insight to students in the field of occupational health. In addition, this study can also add to the library collection in the STIKES Bhakti Husada Mulia Madiun library related to factors associated with the level of work fatigue in permanent workers at the Purwodadi Sugar Factory in Magetan. For future researchers, it is hoped that they can improve the results of this study by using more diverse measurement methods and adding other variables that have not been studied in this study.

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