

Relationship between Age, Working Period and Work Duration with Fatigue on Pedycab Drivers in North Kotamobagu District, North Sulawesi Indonesia

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Abstract—Objective: The purpose of this study is to determine the relationship between age, working period and work duration with work fatigue on the driver of the pedycab in North Kotamobagu District North Sulawesi Indonesia. **Method:** This type of research is a survey research that is analytic observational with cross sectional approach applied in January - May 2016. Respondents in this research are the pedycab drivers in Bilalang I and Bilalang II villages with a total sample of 38. Instruments used is the Work Fatigue Measurement Questionnaire (KAUPK2). Data analysis was done by using Chi-Square statistical test. Independent variables studied were age, work period and duration of work. **Result:** Based on the results of the research that there are 18 driver who experienced fatigue category and there are 20 drivers in very tired category. There was a significant correlation between age with the work fatigue of driver ($P = 0,000$), there was a significant relationship between the working period with the working fatigue of driver ($P = 0,000$), and there was a significant relationship between work duration with the work fatigue of driver ($P = 0,000$). **Suggestion:** There is a need for different working time setting for the pedycab drivers. Because the pedycab design is performed by the workshop based only on experience, it is necessary to conduct research on the design of the pedycab according to the anthropometry of the driver.

Index Terms—pedycab, age, work duration, fatigue

I. INTRODUCTION

Motorized Pedicab (Pedycab) is a public transportation which is the result of modification of a human-powered pedycab that turns into a powered machine where local people names bentor, and is one of the popular means of transportation in Indonesia and has been found in several districts in Indonesia, among others, in East Java, Central Java, North Sumatera, North Sulawesi, Gorontalo and several other regions in Indonesia. The benefits of

pedycab in addition to reaching the destination faster than human-powered rickshaws, motorized pedicab can be an option to reach destinations that can not be reached by urban transport [1].

Fatigue is a mechanism of body protection in order to avoid further damage so that there is recovery after rest. Work fatigue, will decrease performance and increase the level of work errors. Increased work errors will provide opportunities for workplace accidents. Static muscle loading if maintained for a long time will result in RSI (Repetition Strain Injuries), ie muscle, bone, tendon, and other muscle caused by repetitive types of work. Indications of fatigue show different conditions for each individual, but all lead to loss of efficiency and decreased work capacity and endurance. [2].

Occupational fatigue is an individual's total response to psychosocial stress experienced in a certain period of time and work exhaustion tends to reduce the worker's achievement and motivation [3]. Occupational fatigue refers to a feeling of fatigue and discomfort associated with activities that last a long time when a person works and can also be interpreted as a decrease in efficiency, work performance and reduced physical strength or endurance to continue activities that must be done [4]. Occupational fatigue will reduce performance and increase the level of work error. Increased work errors will provide opportunities for work accidents in the industry. Static muscle loading, if maintained for a long time will because in RSI (*Repetition Strain Injuries*), namely pain in muscles, bones, tendons, etc. caused by repetitive types of work. Fatigue also occurs due to the accumulation of residual products in the muscles and blood circulation, where the residual product is limiting the continuity of muscle activity. That this residual product affects the central nervous system, causing a person to be slow working because he already feels fatigue [5].

Symptoms that related to fatigue are: a) Weakening of activities is characterized by symptoms: headache, feeling tired, legs feeling heavy, yawning, feeling confused and others; b) Weakened motivation is characterized by symptoms of tiredness of talking, being nervous, unable to concentrate, tend to forget, not diligent in his work and others; c) Physical weakness is characterized by symptoms: headache, stiffness in the shoulder, back pain, depressed, tremors in the limbs, spasm of the eyelids and feeling dizzy [6]. The process of fatigue occurring in the driver is simply three levels, namely at the initial stage of alertness, then the driver will experience an initial decrease in alertness that appears drowsy and at this stage there is a decrease in alertness so that the vehicle is not controlled. Therefore, to prevent further fatigue effects such as an accident, it is better to carry out with rest [7].

Other factors that can affect work fatigue are: a) Age. Age is one of the important factor that affects the work fatigue. The older a person is, the more productivity decreases and usually experience fatigue faster [3]. Age can also affect reaction time and feelings of tiredness of workers. Older workers experience a decrease in muscle strength but this condition is balanced by better emotional stability than young workers so that they can think positively in work. The age of a person's will affect the condition of the body. The older workers is the greater the level of fatigue felt. physical function of the body that can change due to age factors affect the body's resistance. Some physical capacity such as vision, hearing and reaction speed decrease after 40 years or more. The maximum aerobic capacity of a man occurs at the age of 20-30 years and at 70 years the value is half that of 20 years old, while in women the peak is found at puberty, but the decline occurs at menopause. Because of a decrease in physical capacity and changes in functions and systems in body with increasing age, there is also a change in work capacity. In old age, the level of work ability is less because the physical condition decreases, causing fatigue more quickly, while in younger workers the physical condition is still good so that the work capacity is higher [6]; b) Working period; The working period is closely related to the ability to adapt between a worker and his work and work environment. The adaptation process can have a positive effect that can reduce tension and increase work activity or 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 decline in psychological and physiological functions. Pressure through the physical at a certain time will result in reduced muscle performance, the symptoms shown can be in the form of lower movement, it is not only caused by a heavy workload but more on the pressures that accumulate each day at a long period [8]. Working period can affect work fatigue both positive and negative influences. Positive influence occurs when the longer a worker works, the more experienced the work, the negative influence if the longer a worker works will cause fatigue and boredom, because the longer a worker

works, the more workers are exposed to the danger posed by the work environment. Another negative impact is the existence of a limit to the body's resistance to work processes that result in fatigue. Continuous work can affect the circulatory system, digestive system, muscles, nerves and respiratory system [6]; c) Duration of Work; Working time or duration of work for a person determines work efficiency, effectiveness and productivity. The most important aspect in terms of work time includes the length of time a person is able to work well, work time a day according to a period which includes day and night. Besides that the duration of work for a person also affects fatigue because it can determine the efficiency and productivity of a job. The duration of work a day is generally 6-10 hours, the remaining 14-18 hours) is used for family and community life, sleeping and others. According to Law No. 22 of 2009 drivers of motorized vehicles in certain cases can be employed for a maximum of 12 hours a day, including a 1-hour rest period. Extending work time more than this ability is usually accompanied by a decrease in productivity and a tendency to fatigue, illness and accidents. In a week a person can usually work well for 40-50 hours. More than that, there is usually a tendency for negative things to grow. The longer the working time, the more likely it is that things are not desired [6]. In Indonesia more than 65% of workers come to the company polyclinic with complaints of work fatigue. Factors that cause fatigue in the industry are very varied, which is influenced by workload, work environment, physical problems, and health conditions can also be influenced by individual factors such as: age, health status, nutritional status, diet, gender and psychological conditions. Risks that can be caused due to fatigue include a decrease in work motivation, low performance, low quality of work, a lot of work mistakes, low work productivity, work stress, work-related illness, injury, and work-related accidents. Therefore, preventive, curative and rehabilitative actions are needed to overcome these risks [9].

The ILO data states that every year two million workers die from occupational accidents, one of the causes is fatigue. The results of this study found that of 58,115 samples, 32.8% of them or about 18,828 samples run out. Labor and Transmigration of Indonesia Ministry said that in Indonesia everyday an average of 414 work accidents occur, 27.8% due to high fatigue, about 9.5% or 39 people with disabilities. Work-related fatigue levels experienced by workers can cause discomfort, disruption and decrease in satisfaction and decreased productivity as indicated by decreased speed of performance, decreased product quality, loss of authenticity, increased errors and damage, and frequent accidents, due to lack of attention and inaccuracies in carrying out the work as a result of the fatigue experienced [10]-[12].

Work accidents and occupational diseases are diseases that often occur in the formal sector and the informal sector (such as manufacturing, transportation, construction, mining, tourism). One of the informal sector workers is transport drivers who have the potential to experience work accidents in the form of traffic

accidents. Factors related to traffic accidents are strongly influenced by the driver of the vehicle. Drivers are required to drive their vehicles naturally and full of concentration. This is because the driver is fully responsible for the safety of himself, the passenger, the cargo that is carried along with the other vehicle. In these conditions it can be very tiring for the body members, especially the eyes and mind, because they have to stay focused for hours. Driving is one type of work that is known to be tiring because it is a monotonous job and work that requires ongoing attention [4]. Based on research conducted in New Zealand in 2002 to 2004, it shows that work fatigue that occurs in drivers is one of the factors that contribute about 11% of 134 accident cases that cause fatalities and become one of the factors that contribute about 6% of 1,703 cases of accidents that cause injuries (both severe and mild each year [7].

Transportation Office Kotamobagu noted the number of pedycab in Kotamobagu City about 1,523 units. Based on surveys and preliminary interviews on drivers found in Bilalang Village, some pedicab drivers complained of back pain (shoulder, back, hip) of the neck, hands, buttocks and legs.

The general purpose of this study was to determine whether there was a correlation between age, working period and work duration with work fatigue in pedycab drivers in North Kotamobagu District.

II. METHOD

This research is survey research that is analytic observational with cross sectional approach method, that is to know the relationship of age, working period and duration of work with work fatigue on the driver of the pedycab. The population in this research is 38 driver pedycab in North Kotamobagu consisting of Village Bilalang I amounted to 20 people and Bilalang II amounted to 18 people. The sample of this research are total population. Instruments used in this study are (KAUPK2) Questionnaire Measurement Tool Feelings of Work Fatigue [10]. To determine the level of work fatigue in the driver is measured by summing the scores of the questions. Analysis of respondent characteristics is done by presenting the frequency distribution of the variables studied and presented in tabular form and narration, to determine the proportion of each variable studied [9], [10]. Bivariate analysis to know there is correlation between independent variable (age, working period and duration of work) to dependent variable (work fatigue on pedycab driver) by using Chi-Square statistic test. The results of statistical tests are presented in tabular form and narration.

III. RESULTS

Age group of respondents with age ≤ 34 years were 25 respondents (66%), and age > 34 years was 13 respondents (34%). The working period of respondents ≤ 5 years there are 22 respondents (58%) and the working period > 5 years is 16 respondents (42%). Duration of respondents ≤ 12 hours there are 25 respondents (66%)

and duration of work > 12 hours there are 13 respondents (34%).

TABLE I. DISTRIBUTION OF WORK FATIGUE RATE OF PEDY CAB DRIVER IN NORTH KOTAMOBAGU DISTRICT 2016

No	Level of Work Fatigue		Percentase (%)
	Fatigue	Frequency	
1	Less Fatigue	0	0
2	Fatigue	18	47,4
3	Very Tired	20	52,6
Amount		38	100

Table I shows there were 20 respondents (52.6%) category very tired, 18 respondents (47.4%) category fatigue.

Relationship between Age with Work Fatigue

TABLE II. RELATIONSHIP BETWEEN AGE WITH WORK FATIGUE

No	Age	Level of Work Fatigue		Total	P
		Fatigue	Very Tired		
1	≤ 34 Years Old	18	7	25	0,000
2	> 34 Years Old	0	13	13	
Amount		18	20	38	

Table II shows the result of chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is a relationship between age with work fatigue on the pedycab driver in North Kotamobagu district.

Relationship between Working Period with Work Fatigue

TABLE III. RELATIONSHIP BETWEEN WORK PERIOD WITH EORK FATIGUE

No	Work Period	Work Fatigue		Total	P
		Fatigue	Very Tired		
1	≤ 5 Years	18	4	22	0,000
2	> 5 Years	0	16	16	
Amount		18	20	38	

Table III shows the result of chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is a relationship between working period with work fatigue on the pedycab driver in North Kotamobagu district.

Relationship between Work Duration with Work Fatigue

TABLE IV. RELATIONSHIP BETWEEN WORK DURATION WITH WORK FATIGUE

No	Work Durtion	Work Fatigue		Total	P
		Fatigue	Very Tired		
1	≤ 12 Hours	18	7	25	0,000
2	> 12 Hours	0	13	13	
Amount		18	20	38	

Table IV shows the result of chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is relationship between Work Duration with work fatigue on pedycab driver in North Kotamobagu district.

IV. DISCUSSION

Age is one of the factors that causes fatigue in work, because the older the worker, his muscle strength decreases and causes the faster feel tired. This generally happens because the physical capacity of labor such as vision, hearing, and reaction speed tends to decrease with age, affecting one's productivity. In muscle tissue the aged will contract and be replaced by connective tissue, muscle shrinkage causes decreased muscle elasticity resulting in bodily disability in various ways [3], [8]. Table I shows there were 20 respondents (52.6%) category very tired, 18 respondents (47.4%) category fatigue. The result of the research at table II shows that the driver of the pedycab is aged ≤ 34 years old, there are 25 drivers who experienced fatigue, with tired categories there are 18 drivers and very tired there are 7 drivers, while drivers pedycab aged > 34 years there are 13 drivers pedycab and all experienced work fatigue with category very tired. The chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is a relationship between age with work fatigue on the pedycab driver in North Kotamobagu district. Although the age is still included in the productive age, but in terms of fatigue both physically and mentally in the age category is a person's work capacity began to decrease compared with the work capacity of a person aged less than 34 years.

Relationship between Working Period with Drivers Fatigue.

Table III shows the result of chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is a relationship between working period with work fatigue on the pedycab driver in North Kotamobagu district. The period of work is the accumulation of time that the worker has undergone the job. The period of work can affect the work of both positive and negative influences. Positive influence occurs when the longer a worker works it will be experienced in doing his job as well as the driver of the pedycab. Conversely, a negative influence occurs when the longer a worker works will cause fatigue and boredom. Other negative effects will affect the mechanism in the body as well as the circulatory system, digestion, muscle, nerve and breathing [11], [12]. The working period can affect work fatigue either positively influence or negative influence. Positive influence occurs when the longer a worker is employed it will be experienced in doing his job, otherwise the negative effect if the longer a worker working will cause fatigue and boredom, because the longer a worker the more workers are exposed to the dangers posed by the work environment [5], [13].

Relationship between Work Duration with Work Fatigue

Table IV shows the result of chi-square test shows that $P = 0,000 < \alpha (0,05)$ means that there is relationship between Work Duration with work fatigue on pedycab

driver in North Kotamobagu district. The duration of working well in a day generally 6 - 10 hours while for motorists in certain cases can be employed for a maximum of 12 hours. The rest (14 - 18 hours) is used for private life in family and community, rest, sleep and others. Within a week, people can usually work well for 40-50 hours more than that most likely for the negative things for the labor and the work itself (Suma'mur, 2013). Drivers of pedycab with long working hours of more than or less than 12 hours are all Fatigue by category of fatigue and very tired. This is because they work on average for more than 8 hours, causing the driver to experience fatigue even if the driver is already doing a break while waiting for passengers.

V. CONCLUSION

There is a relationship between an age with work fatigue on the driver of the pedycab.

There is a relationship between working Period with work fatigue on the driver of the pedycab

There is a relationship between Work Duration with work fatigue on the driver of the pedycab

VI. SUGGESTION

There is a need for different working time setting for the pedycab drivers. Because the pedycab design is performed by the workshop based only on experience, it is necessary to conduct research on the design of the pedycab according to the anthropometry of the driver.

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