

# The analysis of work improvement of short ergonomics break on the rice weeding farmers in Kebon Bantiran, Bajera, Tabanan

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**Abstract:** Weeding rice in paddy fields is mostly done by female farmers, as it is done by farmers in Kebon Bantiran village, Bajera, Tabanan. The body position of the female farmers when weeding the rice in the paddy field is bent and both feet are buried in the mud. The purpose of this study was to find out and describe the workload of female farmers when weeding rice plants in the rice fields. The sample for this study is 10 female farmers. The method of this research is the measurement of pulse with the 10 pulse-method. Data collection is done twice, after-work and after a short break. The data obtained are analysed by a t-paired test. The calculation results obtained the mean after-work pulse rate of 115.25 pulse per minute, while the resting pulse rate was 95.50 pulse per minute, decreased pulse rate was 19.75 pulse per minute or decreased by 20.68 percent. In the statistical test, the t-paired test decreased significantly (p is less than 0.05). The workload of female farmers to weed rice is a mild category. The percentage of cardiovascular load (CVL) for female farmers when weeding rice was 19.99 percent which indicates the category required for work improvement. The percentage of CVL value is calculated from the level of workload classification based on the increase of work pulse compared to the Vanwonteghem maximum pulse and categorized it into the classification of light or moderate workloads, so this need improvement by taking a short break.

**Keywords:** ergonomics, short breaks, female farmers

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## Introduction

The human factor plays an important role in the sustainability of a company, so it is important for companies to focus on the conditions of their workers in completing work. Each type of work performed will have a different workload. Ideally, the workload received by a worker is in accordance with his abilities. However, several adverse effects can occur if the physical load of a job has exceeded the physiological capacity experienced by the worker. The impact of work activities from the exertion of human resources that exceeds their ability is low work comfort, high levels of worker absenteeism, causing physical and mental stress and affecting the health of workers [1].

Physical work (manual operation) requires human physical energy as a source of energy (power), where work performance will fully depend on humans who function as a source of power or work controllers [2]. The energy released or consumed occurs because of the metabolic processes that occur in the muscles which are supported by the cardiovascular system and the respiratory system in the body [3].

The human factor plays an important role in carrying out activities, so it is important to focus on the conditions of workers in completing work. Each type of work performed will have a different workload. Ideally, the workload received by a worker is in accordance with his abilities. However, several adverse effects can occur if the physical load of a job exceeds the physio-logical

capacity experienced by the worker. The impact of work activities from the deployment of human resources that exceed their abilities, namely low work comfort, high levels of worker absenteeism, causing physical and mental stress and affecting the health of workers.

Tabanan Regency is famous for the nickname of rice bowl because most of its inhabitants, both men and women work as farmers, with the rice fields that stretched very wide. Before planting, the rice fields are plowed first using the tractor and hoe. The process of plowing is prepared for planting rice at the period of the next, which is done 6 months once by planting the best rice seed.

When the rice is 30 days old, the farmers hold a weeding process because the roots of rice have spread in the mud. Weeding is the process of removing and cleaning the grass in the middle of the rice fields. The weeding process carried out by farmers is generally still done traditionally. The position of the body of the farmers at the time of weeding is bent, and both of his legs up to the calves are set in the mud. Positions of the body carried out by farmers by force can increase the workload and can reduce work productivity [4].

Research on the CVL percentage that has been carried out is according to, which states that CVL percentage of female operators are in the category of needed repair and only 60% of male operators are in the category of needed repair, the rest are in the category of not experiencing fatigue [3]. There are 3 out of 15 employees who receive physical workloads that need improvement with the percentage of CVL respectively 38.12%, 32.12% and 35.40% [5]. The percentage of CVL (31.72%) that it is suggested for improvement or recovery is workers with assembling operator positions [6]. CVL percentage of craftsmen included in the classification of physical workload needs improvement, namely craftsman 2 with a value of 54.65% while other craftsmen get a value of <30% which means it is included in the classification the workload does not occur fatigue [7].

Labor in farming is one important element besides land, capital, and management. There are 3 types of labor in farming, namely human labor, animal labor, and mechanical labor. Meanwhile, human labor can also be divided into three type, namely male workers, female workers, and child labor. In agriculture, women are not only act as a housewife only, but not infrequently also found the women who work for the farm. They work in several aspects of production, post harvest, food distribution and consumption. They do not only play a role in agricultural activities which aims to increase income family, but they do play important part of the decision maker too [8].

In connection with the foregoing, this research is carried out related to the ergonomic problems that exist in farmers in carrying out rice weeding activities in the fields. Doing rice weeding in a body position that is not forced or comfortable, safe, healthy, effective, and efficient to increase the work productivity of farmers [9] and taking short breaks can reduce the workload [10]. Based on the description above, the purpose of this study is to focus on the ergonomics application of female rice farmers with short breaks to reduce workload.

## Methodology

This research uses experimental methods, namely direct observations of the farmers perform weeding of rice. The subjects of this study were 10 workers with an age range between 23 - 47 years who worked for a period of 8 hours of work a day. Meanwhile, the object of research is the measurement of work and rest pulses (heartbeat). Data processing to assess the level of lightness or severity of physical workload is carried out in several stages, starting from measuring the pulse, calculating the 10-pulse method, and calculating CVL percentage.

As state by A. Manuaba, short breaks reduce the workload [10]. The workload can be determined by measuring the pulse rate of workers, in this case, are the farmers. The method of measurement of the pulse is using the method of 10 rates [9]. The type of data used in the research is the data quantitative data sourced from the primary data are directly collected from the results of the experiments on the farmers to do weeding rice paddy in the village of Kebo Bantiran, District of Bajera, Tabanan Regency. According to the measurement of mental workload, this can be done in general in three ways, namely as follows: Measurement of workload objectively; Measurement of workload by task selection; Subjective measurement of workload [11]. The maximum pulse rate is (220-age) for men and (200-age) for women. From the CVL

percentage calculation, it will then be compared with the predetermined classification [12] as follows.

1. Less than 30% = There is no fatigue
2. 30- <60% = Need improvement
3. 60- <80 = Short time work
4. 80- <100% = Immediate action is required
5. More than 100% = Not allowed to move

The classification assessment of the level of indirect workload can be determined from the percentage of cardiovascular load (CVL percentage) [13] [14]. Mental workload is a person's mental needs, such as: thinking, calculating, and estimating something [15].

## Results and Discussions

### Results

The number of samples in this study were 10 female farmers who do the weeding rice plantation. Data collection was conducted three times measurement of the pulse, i.e., early in the morning before doing the job and during the day after work, as well as short breaks in everyone hour of 5 minutes. Data characteristics of 10 female farmers weeding rice plantation are shown in Table 1.

**Table 1.** Data Characteristics of the female farmers weeding the rice plantation

Parameter	Mean	Standard Deviation	Range
Age (Year)	65.50	5.45	60-75
work experience (Year)	12.00	6.50	4.00-30.00

Data collection is performed to 10 female farmers doing the weeding rice field in the village of Kebon Bantiran, district of Bajera, Tabanan Regency, obtained several data before and after work as shown in Figure 1. The observations are made for 7 days. The data obtained are further analyzed using the SPSS (Statistical Package for the Social Sciences) version 15. The statistical test used a paired t-test [16]. The results of the data analysis are shown in Table 2.



**Figure 1.** Female farmers weeding the rice field

**Table 2.** The pulse rate after intervention

Variable	Mean	Standard. Deviation	Range
Pulse before work	65.75	5.20	60-75
Pulse when work	115.25	7.65	90-125
Pulse during break time (5 minutes) every 1 hour	95.50	6.30	75-100

The analysis of the significance of CVL percentage for the two periods is presented in Table 3. The CVL percentage for the two periods is different significantly, with a probability value of 0.001 ( $p < 0.05$ ).

**Table 3.** Paired T-test of CVL percentage before and after treatment

Variable	Period	Mean	Different mean	T	P
	before work	44.16			
% CVL			5.51	22.56	0.001
	when work	38.65			

## Discussions

Table 2 shows that the calculation result of the pulse rate obtained when work is 115.25 pulse/minute. According to Grandjean, the workload of weeding rice farmers belongs to the category of moderate. The average pulse of heartbeat during break time for 5 minutes every 1 hour is 95.50 pulse/minute. Therefore, the pulse rate during break time turns out to decrease of 19.75 pulse/minute or decrease of 20.68%. Table 3 shows a statistical test with paired t-test. It turns out that the decrease was significant ( $p < 0.05$ ).

Another way to determine the magnitude of the classification of physical workload carried out by female farmers do the weeding of rice is the use of Vanwonteghem classification [17], namely the classification of physical workload on the cardiovascular load. The classification is based on the average pulse rate of rest (break time), the pulse rate of working time and the pulse rate maximum of 8 hours [6], with the following formula in Equation (1) and (2).

$$\text{Pulse a maximum of 8 hours} = 200 - \text{age (in years for female)} \quad (1)$$

$$\% \text{ CVL} = \frac{100 \times (\text{pulseworking} - \text{pulsebreak})}{\text{pulse max 8 hours} - \text{pulsebreak}} \quad (2)$$

CVL = Cardiovascular load

So, the percentage of the cardiovascular load (% CVL) of female weeding rice farmers amounted to = 19.99%. According to Vanwonteghem, it can be categorized into light or moderate category from the classification workload. The body position of the farmer at the time of weeding the rice in rice fields are bending with both of her feet immersed in the mud up to the calf. The job of a farmer is monotonous and repeated, the working environment of the scorching sun at daytime and the wind is relatively tight. The body position of the working female farmers weeding rice is bent continuously in a long time. It is very unfavorable.

It is difficult to provide an ergonomic intervention on the work position of the female farmers at the time of weeding of rice in the rice fields because of the work in the rice fields that demanding the position of a body is always bent. Intervention can be done on work time to provide short breaks of 5 minutes in every hour. This is similar with the study conducted by R. S. Ayuba [7], and short breaks for a few minutes every hour to reduce musculoskeletal disorder and can reduce the workload as stated by H. I. Suyasning [18].



**Figure 2.** The working position of a female farmer in weeding rice field

## Conclusion

The position of working female farmers do the weeding of the rice fields is bent, with both feet set in the dirt more or less up to the calf. The workload of the female farmers while weeding rice in the rice fields of 115.25 pulse/minute, after a short break the workload of 95.50 pulse/minute and decrease the workload of 19.75 pulse/minute or decrease of 20.68%, categorized of light (moderate), while the load cardiovascular also categorized of light, CVL of 19.99%, shows that the work category needs improvement which indicates the category of light work, so the improvement needs to be done is to perform short breaks.

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