Computer Software Tones Assessment Improving the Blades Tones Accuracy Balinese Gamelan Performance

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Abstract

In making gamelan tone arrangement highly depends on aligner sense and feeling. Each gamelan's craftsman has his way of aligning with different standard of tone. This causes a performance tune on the blades gamelan has incorrect frequency. To get the right tone harmonization should take measurements tone repeatedly, depending on work experience, and their hearing sensitivity. But in fact they are now, aligning power is limited, most of them elderly. It also led to the production of gamelan takes a long time, and the number of aligning is also very limited. The gamelan's craftsman when doing his activities is in his natural manner in order to avoid the illness because of work. To anticipate the limitation of human resources in the field of alignment and to maintain the consistency of the gamelan's tone in the long period of time it is in need for the touch of information technology in the form of software. The software to analyze the frequency of gamelan's base tone in order to get the result of the tone in the strip of gamelan which is measurable and in accordance with the expectation.

Experimental research with treatment by subjects design, involving 15 samples of people who doing the activities in the condition before and after implementation. Accuracy tones, work productivity, satisfaction, were analyzed using the t-paired sample t-test testing, in the level of significance of 5%. Finding in the field showed that, after the assessment tone using the software, there was an increase of the aligning assessment accuracy of Bali's gamelan by 4.26%, an increase of work productivity by 29.63%, an increase of evaluator's satisfaction by 27.91%.

Keywords: *Software , Tones assessment, Blades tester*

1. Introduction

1.1 Background

In the last three decades, Bali's *gamelan* becomes a pride, proved by a lot of art enthusiasts from many countries around the globe come to study it either the theory or the practice, even there is the acknowledgement which put the Bali's *gamelan* in the good category. Not only in Bali, in the several parts of the world there are several groups of Bali's percussion art enthusiasts such as in United States, Canada, Europe, and other countries. This in turn has the impact of increasing the demand for the set of Bali's gamelan (Triguna, 2011). But behind the melodious sound of Bali's gamelan, accompanied with the increasing of demand of the gamelan set, there is a basic problem in the production process. In performing his activities, the aligner has not been in the natural manner position, so that highly risk of illness because of work. Related with the issue it is deemed necessary to redesign the workstation that suitable with the natural work manner based on the anthropometric of the workers. The limitation of the skillful aligners also has an impact to the process of the finishing of the Bali's gamelan.

More than 30% of the skillful workers who still actively working as the gamelan's aligners are in the age of 60 years and older (Sudarma, 2011), and nearly 90% of the aligners having a deaf in one or both of their ears, that is the conduction deaf and sensorineural deaf. The loss of the hearing is as the result of the noise exposure which takes place repeatedly in the long period of time. This condition will have an impact to the tone accuracy outcome. Even, with the development of technology and globalization not many of the young generation nowadays who wants to involve as the gamelan craftsman especially as the aligner. This is very worrying to the continuation and sustainability of the availability of the Bali's gamelan in the future. To

anticipate the limitation of the human resources in the field of aligning and to maintain the consistency of the gamelan tone in the long period of time it is deemed necessary for the touch of information technology in the form of software.

Based on the problem mentioned above, to achieve the expected result then computer software is designed to measure the tone as the substitution of the aligning sense of hearing in assessing the strip tone which leads to the change of work attitude. The objective of the research is to find out the increasing improving the accuracy blades tones performance after using the computer software design.

1.2 Purpose and Use of the Research

The general purpose of this research is to find out the improvement of Balinese gamelan tone tester performance after the implementation of computer software. The use of this research is that this computer software can be used as the aid tool in the assessment of tone tester which is more measurable.

1.3 Research hypothesis

Implementation of computer software increase accuracy, accelerate time assessment, and satisfaction of Balinese gamelan assessor.

2. Research Method

The research is the experimental research by using treatment by subject design. Sample collection technique conducted by simple random sampling, that is everyone who fulfilled the inclusion criteria has the same opportunity to be selected as a sample in this research. The size of the sample is determined by using the Colton's formula (1985) with $\alpha = 0.05$ and $\beta = 0.1$. The outcome is obtained that the amount of samples are 15 persons, who are selected simply randomly with toss-up technique. The research variables are identified and classified as follows:

    a) independent variable is the computer software;

    b) dependent variable is the aligner's performance who is assessed by the accuracy, accelerate time assessment , satisfaction; and

    c) controlled variables which consist of: aligner's internal factors (age, gender, health), and external factors (wet temperature, dry temperature, relative humidity, wind velocity, noise, and light intensity).

The data analysis conducted by the way as follows:

    a) descriptive analysis;

    b) normality test by using Shapiro-Wilk test;

    c) accuracy, productivity, satisfaction, were analyzed using t-paired test and data of the rest pulses and weariness prior to work was tested with Wilcoxon test in the real level (α) = 0.05.

    d) Data is processed using SPSS for Windows version 18.0 program.

3. Result and Discussion

3.1 Computer software design

The result of computer software design reliability test, involving 30 competent respondents in the field of program application found out that 66.7% of respondents said that computer device had a complete feature and 33.3% said that it had very complete feature; 73.3% said that computer was reliable and 26.6% said that it was very reliable; 33.3% said it was easy to use and 66.7% said it was very easy to use; 73.3% said it was safe and 26.7% said it was very safe; and 13.3% said it could document well and 86.7% said the documenting was very well. Computer program is the program used to match the gamelan's instrument tone used as the tested tone with gamelan's instrument tone that used as the basic reference.

3.2 Accuracy, Work Productivity, and Satisfaction

The accuracy assessment of gamelan's tone is the level of result proximity achieved to the tones which the quality is assessed or counted. Thus the output is compatible with the degree of truth that expected. Based on the result of the study it is found out that the average of accuracy level at first period is $94.60 \pm 0.83\%$

and the average at second period is $97.93 \pm 0.96\%$ (Figure 1). The meaning analysis with t-paired test shows that both groups after treatment, the average of the tone accuracy level differs significantly ($p < 0.05$). The increasing of the accuracy level by 4.26% after using computer software is due to when in the process of reference tone alignment the frequency is already known, so that easily to bring closer the aligned blades with reference tone frequency.

The productivity basically is the outcome from all the activity components. In this research the productivity is counted based on the amount of blades that can be aligned in one working hour divided by working pulses multiplied by 1 working hour. Based on this study it is found out that the average of working productivity at first period is 0.382 ± 0.034 strip/ pulse and the average at second period is 0.543 ± 0.052 blade/pulse (Figure 2). The meaning analysis with t-paired test shows that both groups after treatment, the average of the productivity differs significantly ($p < 0.05$).

Further it is found out that there is the increasing of productivity by 29.63%. The increasing of worker's productivity and suppressing the high cost is one of the advance steps to win the global competition such as to make use of the human resources and suppress all kind of costs but increase the optimal production output. Suppress the cost as small as possible such as the cost required to pay the health benefits and sickness rehabilitation due to working, accident and injury. This can be done by developing the working condition and environment that is healthy, safe, and comfortable. In other words is that by implementing work effectiveness such as selecting and transferring the technology which is highly efficient. Technology advancement is one of the factors that determine work productivity since it will simplify the workers in making the proper goods or services. The result of the study is in line with the result by Suputra (2003) who stated that the usage of the chair and working table that compatible with the workers' anthropometry can increase the work productivity by 16.87% ($p < 0.05$) for the Palimanan's rock rooster sculptures at Mahkota corporation Bali. So is the research by Nuada (2005), also stated that the development of chair dimension and the height of suitable working space with the anthropometry of brick makers can increase the work productivity of the brick makers by 167.25%.

The satisfaction assessment of gamelan's aligner is the feeling about the pleasure or is not a result that is being done. The manner of someone to the assessment result, the high level of satisfaction will have positive attitude towards the assessment. Based on the result of the study it is found out that the average of satisfaction at first period is 16.87 ± 1.06 and the average at second period is 23.40 ± 0.91. The meaning analysis with t-paired test shows that both groups after treatment, the average of satisfaction differs significantly ($p < 0.05$).

The increase of satisfaction score by 27.91% due to the time needed is shorter than previous working time, the level of accuracy also increasing, so is the work effectiveness also improve the satisfaction for the aligners. Basically the assessment satisfaction is the individual thing. But in this case the software is built based on the rules or criteria in the Bali's gamelan tones. The degree of satisfaction towards the assessment of a gamelan aligning is not individual by nature anymore but already in the frame of reference in the gamelan's tones pitch.

Satisfaction is also affecting the persistence of aligners in doing their activities. The aligners with high satisfaction tend to work with high spirit. The quality of work and the outcome that can be achieved by the satisfied people with their working outcomes will create the satisfaction also to the user of the product, in this case is Bali's gamelan set. Work satisfaction is the wish of everybody. Someone who satisfied will cause better health compared to the disappointed people (Parasuraman et. al, 1988). Satisfaction also related with the feeling of safety and comfort. The aligning satisfaction related to the availability of physical facilities to assist the aligning activities, the tools' reliability and the tools' benefit. This opinion is in line with the study by Titin (2010) who reported that the ergonomic intervention in the stamping part body component activities in stamping plant division at PT. ADM Jakarta increase the workers' work satisfaction by 8.83%.

3.3 The weakness of research

To reach 100% tone accuracy against to the reference tone is impossible to get. It is due to the caution

factor of the aligners in the blades grinding process that still performed manually. Where as if the grinding is carried out until approaching or even reaching 100% accuracy highly risked in causing excessive grinding that resulted in blades cutting or even re-smelting of its materials. The attainment tone will reach 100% accuracy to reference tone if the gamelan's blades grinding process is carried out by computer system, since the process will controlled automatically.

4. Conclusion and Suggestions

4.1 Conclusion
Based on the result and discussion mentioned above, so it can be concluded as follows:
1. Computer software improving the accuracy blades tones assessment of Balinese gamelan.
2. Computer software improving of work productivity blades tones assessment of Balinese gamelan
3. Computer software improving the satisfaction blades tones assessment of Balinese gamelan

4.2 Suggestions
Based on the research conclusion mentioned above so it can be suggested as follows:
1. For the next research, to grind the gamelan blades with the rugged surface such as *terompong* is very difficult in the aligning process, for it should be designed of the holding tool with the easily adjusted size.
2. With the result of the study it should be exist of the tone standardization in gamelan pitch assessment system.

Acknowledgements

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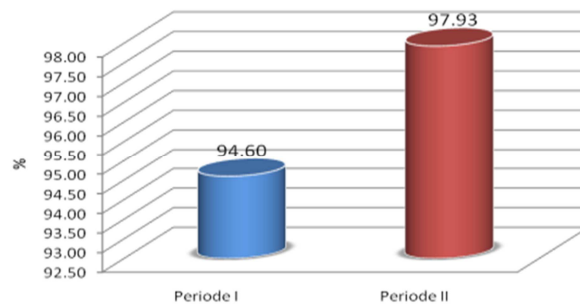
Notes:

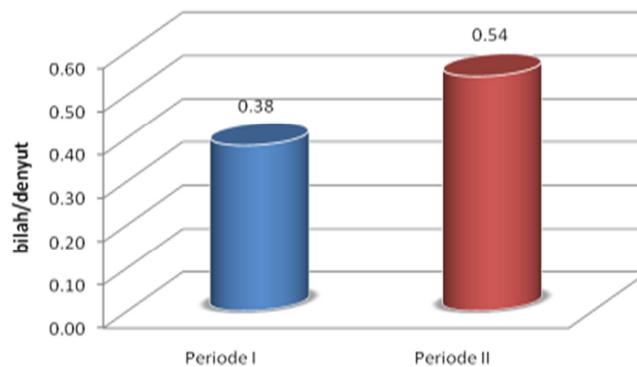**Figure 1. The comparison of accuracy between first period and second period**

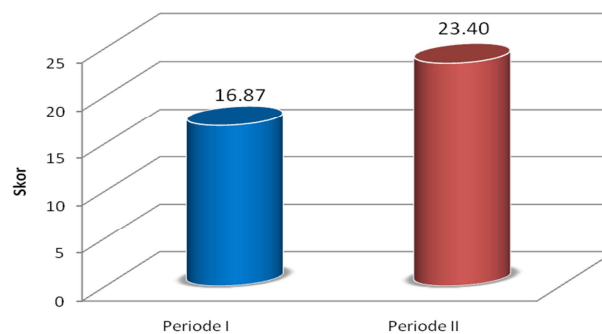**Figure 2. The comparison of work productivity between first period and second period**

Figure 3. The comparison of satisfaction between first period and second period