ABSTRACT

The word of ergonomics is not found in Balinese vocabulary. In fact, the Balinese are very proud to work with comfortable-, and fitted tools in all sectors of their daily live activities, including in the religious ceremony. Therefore, it is hypothesized, that the Balinese applying the ergonomics principles for their better performances. To test the stated hypothesis, a study was carried out. Participatory observation technique was applied. It is followed by interview to the respondents, and also associated with documentation to the subject studied. Subject studied were the offerings made in conducting religious ceremony, the temporary building for cremation of the dead body, and the temple building. The results found are as the followings: a) the temporary building for religious ceremony is made based on the anthropometrics measurements of the user, such as upper reach, side reach, knee height, buttock height, shoulder height and shoulder width; b) the forms and sizes of offerings are adjusted according to the place provided; c) the container for an offering has been improved from time to time for efficiency and made of locally produced raw materials; d) the size of offering container is made based on the hand sizes such as grip, width of the hand and counted in traditional unit; e) the interior design, for room or temple building is made fit for it’s appropriate function. Therefore, it is concluded that in doing their daily live activities related to religious ceremony, ergonomics principles are applied. Comfortability, easy to use, and feeling of satisfaction are the criteria in using any kind of tools for Balinese. It is suggested that more research is needed to explore more data on the application of ergonomics in Balinese daily live.

Key words: Ergonomics Aspect, Hindu Religious Ceremony, Balinese

ABSTRAK


Kata Kunci : Aspek Ergonomik, Agama Hindu, Upacara Bali
Introduction

Bali island, which is about 3,412 km² is located between Java and Lombok islands. Most of the population (97%) are belong to the Hindu followers, and the rest are Moslem, Christianity, and Budism. Therefore, in the daily activities is easily find out the religious ceremony. The Balinese, do believe that life is composed by two aspect things [1,2,3] which called sakala (what is seen) and niskala (which is not seen). The balance between these two things always in their attempts. The offering or yadnya is one the manifestation of the human’s efforts in maintaining the balance between these two things [1,2,3].

In doing their daily activities, the Balinese always try to fit their tools or equipments for their uses. By trial and error they have to pass-by many experiences in getting a better tools for their lively hoods [4]. In conducting yadnya for example, they always use the tools or container. They make the tools or container using local materials or imported one [1,2]. The sizes of the tools or containers made always fitted to their work capabilities and limitation. The end result are the fitting instruments for their uses.

The offerings are held based on the principle of mutual benefits. Some ceremonies are held regularly in every 15 days, or at least in every 6 months [1,2,3]. Therefore, it is wise to analyses some of the tools used for ceremonial either as a container, or temporary building or permanent building of temple. It is assumed that some of tools used for religious ceremony in Bali are ergonomically designed.

A research on religious ceremony was conducted in Bali. The research problem was how ergonomics is applied in such religious ceremony?

Material and Method

Subject. As subject of this study was ceremonial process of Balinese, included the offerings (size of container), the temporary building for ceremony (height, width), and the building of temple. There were three religious ceremonies observed, namely: Dewa Yadnya, Pitra Yadnya, and Butha Yadnya

Method. Participatory observation was applied [5,6]; it is also associated by documentation photo taking in ceremonies conducted. Interview was also conducted to 25 persons respondent who consisted of owners of ceremonies, the skillful person on offering and priests.

Analyses. From the data gathered it was calculated into mean and SD, then it was compared with the respected anthropometrics value of the owner.

Results and Discussion

The respondents to whom interview were conducted are presented in Table 1. There are 2 priests, 3 expert of offering, and 20 person of community who helps in carrying out the ceremony.

Table 1. The respondents interviewed in a ceremony in Bali, 2005

<table>
<thead>
<tr>
<th>No</th>
<th>Respondent profession</th>
<th>N</th>
<th>Age range (year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Priest</td>
<td>2</td>
<td>56 - 65</td>
</tr>
<tr>
<td>2.</td>
<td>Offerings expert</td>
<td>3</td>
<td>45 – 61</td>
</tr>
<tr>
<td>3.</td>
<td>Helper</td>
<td>20</td>
<td>17 - 60</td>
</tr>
</tbody>
</table>

In Bali there are five kinds of ceremony, namely Panca Yadnya (Panca = five; Yadnya = ceremony). Dewa Yadnya means ceremony for the God; Resi Yadnya means ceremony for priest; Manusa Yadnya means ceremony for human being; and Butha Yadnya means ceremony for the living thing below human being [1,2,3,7]. Almost in all ceremonies conducted are needed container, tools, or material used for composing an offering such as fruits, flowers, and leaves. In general term the instruments for ceremony is called upakara, and the ceremony conducted is called upacara. Water and fire are the other materials that must be provided for a ceremony [1,2,3].
1) In this study it is criticized the container used; for example in size of daksina (an offering symbolizing the place where the God is placed), the container is made of coconut leaves. The size must be enough for placing one coconut inside, plus a certain amount of rice, one egg. Then at the end the completed daksina should be fitted to place in the inside of temple building. Therefore, it is depend on the container of daksina. If it is to small it can not put all materials used. If it is to big, it may not be put inside the temple building. Based on the past experiences in conducting ceremony, a solution on the size of daksina container was established, and used in further ceremony, as it is shown in the first picture. The goal is for a better use [4].

2) Another container is kelatkat, which consists of bamboo net-working/plaiting. It is a horizontally plane instrument, used for placing some materials or component of offerings. Its size is about two lengkat (the longest distance between the top of thumb and middle finger). By this size it is easy to carry and easy also pass through the gate of building [4]. Look at the second picture.

3) another container is dulang (is made of wood). It is the basic instrument or container for composing an offering, where all materials used is placed on. The height of dulang must be fitted at the upper reach; it’s neck must be fitted to the hand grip. These sizes is needed for easy and good handling in lifting and carrying them. Dulang use too by priest during the ceremony procession as presented in the third picture. It meets also the goals of ergonomics in general [4,8].

4) Basket is another container which made of split bamboo. It is the container of certain offering called suc or catur. This is the main of upakara. It is consists of four kind of offering
components. All those must be fitted in one basket without damaging the components and aesthetically sound. (Picture no.4).

Figure 4 a. basket use to place of *suci*, and b. basket use to place for *catur*

5) In building of *piasan* as a place for the location of holy priest to conduct ceremony, it is built based on the anthropometric measures, therefore fit to the priest when he is sitting. (picture no. 5).

Figure 5 The design of *piasan/pewedan* fit to priest

6) another temple building which called *peilinggih*, or sanggah surya place for the mercy of the God, the height of building is built based on the anthropometric measures; maximum height of its room should below the upper reach and the minimum height should above the mouth height (Picture no.6).

Figure 6 Sanggah surya. The height pof sanggah surya must bellow than the upper reach

7) the temporary building for carrying the dead body to the cemetery (*bade* or *wadah*); before it’s height is based on the caste he (she) belong to. But now, due to the situation and condition it is agreed that the height must not exceeding five meters (Picture no. 7).

Figure 7 Temporary building for carrying dead body to the cemetery (*bade*). a. small size 5 meters height, b. large size 25 meters, 11 ton

In case any one who want to have the such temporary building more that that he should ask permission from the Government Office for temporary disturb of electricity and cable phone for a certain time. In constructing the such building the ergonomics aspect (the dead person and the people who will carry) is taken into consideration. For example one of the temporary building constructed for the late king of Ubud, it is about 25 meter height and 11 ton of weight. The anthropometrics measures taken are the shoulder height, shoulder width which is used for constructing the width of every manhole for carrying the construction easily, and at the end for a better
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performance [4]. That is similar to the goals of ergonomics to fit the man to the task and vice versa [8].

What is noticed in this study is really confirms the study conducted before in cultural aspect [4], and in particular for the agricultural hand tools in Bali. Most of them are ergonomically designed which resulted from trial and error [4,9].

In the process of preparing the ceremony all of task and duty are performed mutually benefit among the community members. In doing that the time schedules are divided into some shifts which precede by a breakfast (panyemeng) at about 6.00 am in the morning; followed by a snack at 10.00 am; lunch time at 12.00-13.00; snack (lelaud) at 14.00 pm; dinner at 18.00 pm; and the last supper at 24.00 mid night. The schedule is passed down from generation to generation, in some villages it is strictly preserved, in another one it adjusted according to situation and condition [1,2,3].

In doing the such ceremony it is needed many materials for making the offerings, the temporary building and other things. The materials used also donated by applying the mutual benefit principle. The materials such as rice, coffee, sugar, eggs, bamboo, coconuts etc. is contributed by the community members. Based on the trend and community changes, for many times it is observed that the donations now is changed into a certain amount of money. Lastly, the collected money is used to purchase all materials used for the ceremony.

The Practices of Ceremony
A. Ceremony for the God (Dewa Yadnya). It is conducted in the evening or at night. It is based on the convenience time for the community. In certain occasion, the ceremony could be conducted at morning time, of course, it is based on the consensus of community members. Mostly the ceremony is performed in one day; but for certain occasion ceremony could also conducted for 5-7 days. It depends on level of ceremony conducted, and the size of community members. Therefore, it is an opportunity for every body to do their worships based on their convenient time. It is a matter of time management [1,2,6].

B. For human being ceremony (Manusa Yadnya). It consists of three months ceremony, tooth cutting ceremony, up to married ceremony. There are at least 13 kinds of ceremonies in Manusa Yadnya [3]. Usually it is conducted in the morning until before 12.00. For the rest of time, they could do their daily routine tasks. It is also a matter of time management [6].

C. Cremation Ceremony (Pitra Yadnya). The appropriate time to conduct ceremony is depend on the community members. If most of community members are farmers it is at morning until 12.00. After that at noon time, every body to be free to do their own works. But for the village where the members mostly are trader the ceremony could be conducted at afternoon after the business time. It is based on the community agreement for the benefits of everyone in the community [1,2,6].

Conclusion

From what have been discussed above it could be drawn the following conclusions: ergonomics principle has been applied by the Balinese people in their cultural ceremonies. The Balinese design the tools or equipments usually using their body part measurements, especially length of finger, shoulder height, standing height, shoulder to shoulder width.

For further study it is recommended that more study needs to conduct on ergonomics aspect of Balinese ceremony.

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