



International Conference Green Architecture for Sustainable Living and Environment (GASLE),
29 November 2014

Embodied energy efficient in the composition of bamboo walls and soil blocks walls

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Abstract

Wall building materials are building materials that greatly affect to building energy. One of the energy is the embodied energy in the building. Ideal building is a building that has energy efficient. Efforts to reduce the amount of energy in the building is done, are to reduce the volume of material, change the type of materials and using low energy materials. This study discussed about the embodied energy efficient due to the material of the building walls. The materials were the composition of bamboo and the soil block. Both of these materials have relatively low embodied energy. The aim of the study was to obtain composition of bamboo and soil blocks wall that have a capable of producing embodied energy efficient. The method used was the optimization of all the embodied energy that is generated by a high composition of bamboo and soil block walls. As the model is a building with a size of 3 x 3 m. While the wall is 2.8 m high consisting of several composition of bamboo and soil blocks walls. The composition of the bamboo and soil block walls is variable research. The result of research obtained a composition of high of soil block wall and bamboo wall is 1 : 1.8, that is able to produce embodied energy efficient.

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Peer-review under responsibility of Department of Architecture, Faculty of Civil Engineering and Planning, Institut Teknologi Sepuluh Nopember (ITS).

Keywords: soil block, bamboo, embodied energy, wall, composition, optimization

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1. Introduction

Building materials have a considerable influence on the existence of the world's resources. Besides building materials also uses a lot of energy for its production process. Good building materials are building materials that are not too much to explore natural resources and also low energy in the production process.

A good building is a building that is much use of local building materials (Amatruda, 2004). It is closely related to the energy transportation. Local building materials do not require too much energy transport, because the distances are relatively near to natural sources building materials and a project that will be performed. A good energy building is a building that has a relatively low embodied energy. Embodied energy is the energy that is used for building materials production process from raw material to be finished material (Petrossian, 2000). Local building materials are building materials that have relatively low embodied energy, because the energy used is relatively low energy transportation.

Pandaan is an area in Pasuruan districts Indonesia in the plateau region, namely in mountainous areas. Cold conditions occur at night and cool during the day. This area has a lot of ground that does not work as agricultural land because it is an area that is not fertile. Also in the area grow clump of bamboo. The second element is the potential to be developed as a building material for this area.

One of the building materials that resemble red bricks and concrete blocks is soil blocks. This block uses the raw material of the local soil and not through the combustion process. So that, this block is a building material with low embodied energy and environmentally friendly. The use of bamboo as a construction element will be able to support the building in this area, so that utilized the materials do not require high transport costs. Composition wall materials between soil blocks and bamboo walls will be sustainable the configuration construction and harness the potential of local as possible.

In the Pandaan area, utilized of bamboo walls is very suitable when used during the day. While the brick wall type is suitable for condition inside the building at night. Therefore, bamboo walls and soil-block walls need to be combined for better building walls.

The main problem in merging the two walls is how area compares of soil block walls and bamboo walls that can generating building that has optimal in embodied energy. This study had the scope of design model of a simple house only discuss to non-structural elements of building construction. The building uses soil block walls and bamboo walls. Result of the study was the design of simple building that uses soil block walls and bamboo walls that have optimum embodied energy.

2. Research method

This study is a simulation of a model of a building in the countryside. The design of the activities of this study as follows (see Figure 1):

1. Characteristics of soil blocks and bamboo in these activities do need to know
2. Creating a model of the building in accordance with rural characteristics.
3. Creating comprehensive alternative types of wall composition.
4. Calculating embodied energy of each composition with the program.
5. Optimization of the embodied energy from each wall composition
6. Getting the ideal wall composition in model building.

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