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Identification of Green Construction Factors in Construction Projects

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Abstract:

The concept of Green Development is a total construction practice from the planning, implementation, and operational stages, which prioritizes health and comfort in activities for humans. through efficient and innovative use of natural resources, this is done for environmental sustainability. This concept is also useful in the long term in economic and social aspects if it is successfully implemented optimally. Green construction is needed to minimize the negative impact on the environment to meet the needs of human habitation.The purpose of study is to identify green construction factors in construction projects. The results of the study obtained 5 green construction factors, and 27 indicators of green construction, where the health and safety management system (X1) consists of 5 indicators (18.51%), environmentally friendly behavior (X2) consisting of 5 indicators (18,51 %), Construction materials (X3) consists of 7 indicators (25.92%), Supplier selection (X4)) which consists of 4 indicators (14.81%), and Energy Conservation (X5)) which consists of 6 indicators (22.25%).

Keywords – Green, construction, indicator, factor, project.

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1. INTRODUCTION

Environmental damage and global warming have become environmental issues that are constantly being discussed in the world, including in Indonesia. The development of construction projects is considered to have a large role in damage or changes in the environment on the surface of the earth. Starting from the construction phase to the operational stage, construction activities require the use of natural resources, where the amount is very limited. (Sinulingga, 2012). In general, the implementation of construction projects has the potential to cause negative impacts on the

environment around the project. The implementation of construction projects cannot be separated from the development of construction projects to support this reliable sector. As we know, currently multi-storey construction projects are progressing and developing in its implementation, where construction buildings are the easiest objects for the implementation of sustainable construction, because it is easier to control in each stage of the activity. Green construction is a sustainable movement that aspires to the implementation of construction, namely from the planning, implementation and use of environmentally friendly construction products. (Harimurti, 2012). In this case, the project implementation stage is very important in the process of construction project activities.

According to Schaefer, (1994), states that the purpose of sustainable construction is to create a construction based on a design that considers the balance of the environment or ecology of the environment, by using natural resources efficiently, effectively and environmentally friendly during the operation of construction projects. According to Du Plessis (2002), part of sustainable construction is green construction, which is a holistic process, which aims to restore, and maintain a balance between natural and artificial environments. USEPA (2010) defines green construction as the implementation of construction by implementing processes that pay attention to environmental ecology, and resource efficiency, throughout the life cycle of buildings from planning, construction, operation, maintenance, renovation, and deconstruction. The purpose of this study is to identify green construction factors in the construction process on a construction project.

According to Sinulingga (2012), planning green construction is by replacing building components with local materials. Sofwan (2009) states that construction entrepreneurs in Indonesia consider the application of the concept of green construction still not profitable because it requires expensive costs, and they have not thought about the quality that will be produced. In fact, the application of the green construction concept will not reduce quality, and even vice versa. Therefore, the concept of green construction will remain wide open for review and implementation in Indonesia.

Green construction is needed to minimize the adverse impacts of development on the environment, the construction sector contributes to natural damage that can be caused by: material harvesting, material processing, material distribution from source to user, construction process, land acquisition for buildings, and energy consumption when buildings are operated . (Ervianto, 2012). According to Glavinich (2008), green construction is the planning and management of construction projects in order to minimize the effect of construction on the environment. The contractor must increase concern for the

environment, always improve efficiency in the process of construction, energy conservation, efficient use of water, and other resources during the construction process, and minimize, and manage construction waste properly so as not to pollute the environment. Glavinich (2008) states that the concept of green construction includes the following: planning and scheduling of construction projects, material conservation, land use, construction waste management, material storage and protection, work environment health, creating environmentally friendly work environment, selection and operation of construction equipment, documentation. Kibert (2008) states that the concept of green construction includes the following: work location protection plans, occupational health and safety programs, construction or demolition waste management, training for subcontractors, ecological footprint reduction, construction, handling and installation of materials, quality air. According to Adji (2016) the target of green construction has 6 criteria to be applied at the project location including: appropriate land use, efficiency and energy conservation, water conservation, project environmental management, source and material cycle, health, and comfort in the project area.

2. METHODOLOGY

The methodology used in this study is to use literature studies to identify green construction factors and indicators based on previous studies, journals, reference books, and relevant literature studies.

3. RESULTS AND DISCUSSION

3.1 Identification of green construction factors

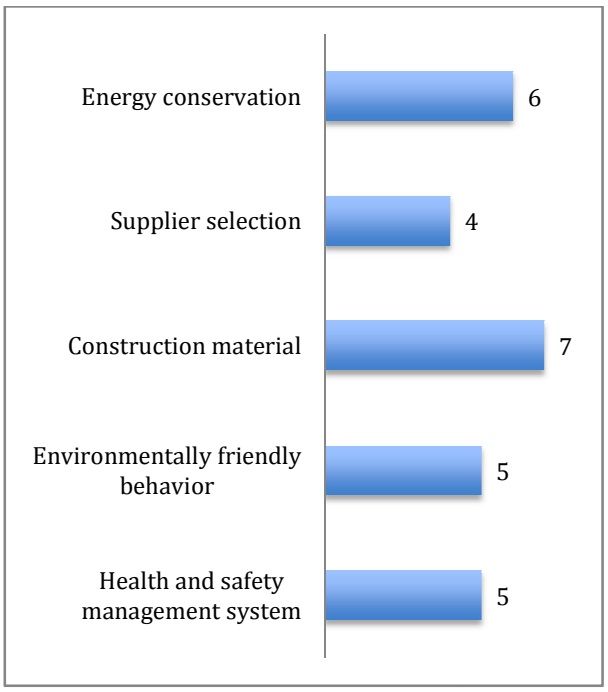
Identification of green construction factors is carried out by conducting literature study based on journals, books, and previous studies. Based on the literature study, there were 27 green construction indicators on construction projects, these factors can be seen in the following Table 1.1:

Table 1.1 Green construction factors on construction projects

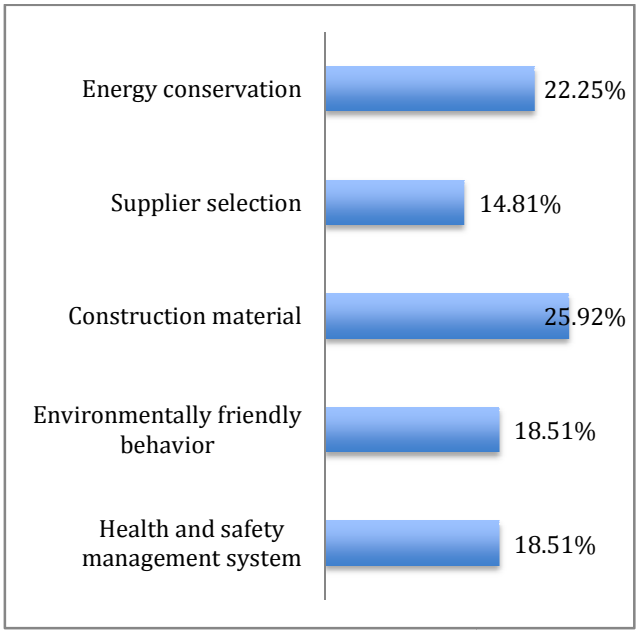
Green Construction Factors	
X1	**Health and safety management system**
1	Work accidents and prevention of disease
2	Continuous improvement in health, safety and environment by involving all relevant parties
3	Concern for the work environment, and considering the environmental impact of each work activity
4	Efficient use of resources to preserve the environment

5	Implement the HSE management system (Healthy, Safety, Environment)
X2	**Environmentally friendly behavior**
1	Environmental training
2	Replanting on land that has been completed
3	Localize the spread of dust with a dust safety net around the building
4	Spray water in areas that appear to contain a lot of dust
5	Protection plans for vegetation and trees
X3	**Constructionmaterial**
1	Transport of concrete mixer trucks is a maximum of 90% of mixer capacity to avoid spilled concrete during the trip
2	Reducing the use of materials that damage the environment
3	Using certified wood
4	Increase the use of local materials (500 mile radius)
5	Building materials that can be recycled, or reused
6	Materials that do not contain toxins or hazardous materials.
7	Prioritizing natural materials
X4	**Supplier selection**
1	Avoid greenwashing
2	Contracts and specifications include the requirements for implementing sustainable practices
3	Evaluation of energy and water conservation
4	Include recycled content in raw materials
X5	**Energy conservation**
1	Double glass window (for ventilation or lighting)
2	Using a central air-conditioning unit operated with natural gas
3	Using energy-saving lamps
4	Install the sensor in the entrance space needed when turning on the lamp
5	The use of sanitary fixture (sink, toilet, heater, etc.) which is efficient in use
6	Using biodiesel fuel

Comparison of the number of green construction indicators on each factor can be seen in the following Graph1.1:



Graph 1.1 Number of Green Construction Indicators



Graph 1.2 Percentages of Green Construction Indicators

Based on Graph 1.1 and Graph 1.2, The results of the study obtained 5 green construction factors, and 27 indicators of green construction, where the health and safety management system (X1) consists of 5 indicators (18.51%), environmentally friendly behavior (X2) consisting of 5 indicators (18,51 %), Construction materials (X3) consists of 7 indicators (25.92%), Supplier selection (X4) consists of 4 indicators (14.81%), and Energy Conservation (X5) consists of 6 indicators (22.25%).

4. CONCLUSION

The number of green construction factors obtained is 5 factors, the number of green construction indicators obtained as a whole is 27 indicators. As for each percentage number of each indicator is health and safety management system (X1) consists of 5 indicators (18.51%), environmentally friendly behavior (X2) consisting of 5 indicators (18,51 %), Construction materials (X3) consists of 7 indicators (25.92%), Supplier selection (X4)) which consists of 4 indicators (14.81%), and Energy Conservation (X5)) which consists of 6 indicators (22.25%). It is expected that further research can add the latest green construction factors, so that the results of these studies can be widely used.

ACKNOWLEDGEMENTS

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