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ECO-EFFICIENCY INDEX FRAMEWORK (EEIR) FOR SUSTAINABLE REINFORCED CONCRETE STRUCTURAL DESIGN

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ABSTRACT

Development of reinforced concrete structure encouraging activities that influence the physical impact to the environment such as pollution, heat island and global warming due to production of excessive unnecessary materials and compound to the environment. Sustainable development concept was introduced to provide better environment that need to fulfil need of economic, environment and social. Construction industry was known as one of the main contributors to the environmental problem where the consideration in the reinforced concrete design does not fulfil needs of sustainability. Therefore, this study was developing the integrated factor between environment and economic factors to fulfil need of the social by applying eco-efficiency reinforced concrete design of the structure with minimal impact to those factors. Development of response surface model was producing as prediction chart to provide eco-efficiency index for reinforced concrete design by using green material as replacement material in concrete which is Blast Furnace Slag. Positive impact towards economical factor and environmental factors was become main consideration on accepting the design as sustainable structure design. Furthermore, the framework produce in this study is acting as guideline to design sustainable reinforced concrete structure and suitable to apply in Green Building Index score under innovation criteria.

Keywords: reinforced concrete structure, sustainable structure design, eco-efficiency index, response surface model, Green Building Index

1. INTRODUCTION

The rapid development of the residential sectors in the world, particularly housing units, resulted in a high energy profile; during the construction phase, massive resources have used that cause a substantial amount of embodied energy or equivalent carbon emission [1]. The concept of a sustainable environment generally refers to the development that creates a balance between the resources consumption pattern and the rate of depletion of natural resources. For determining the level of sustainability of any project, three types of impacts are assessed; economic, environmental, and social. The study has concluded that the correlations established between the cost and carbon emission, economic & environmental scores, and eco-efficiency index have shown a linear trend for single-story housing and a cubic for the double story housing [2-4].

2. METHODOLOGY

The research methodology explaining the overall framework development of Eco-Efficiency Index Framework (EEIR) of Reinforced Concrete Structural Design.

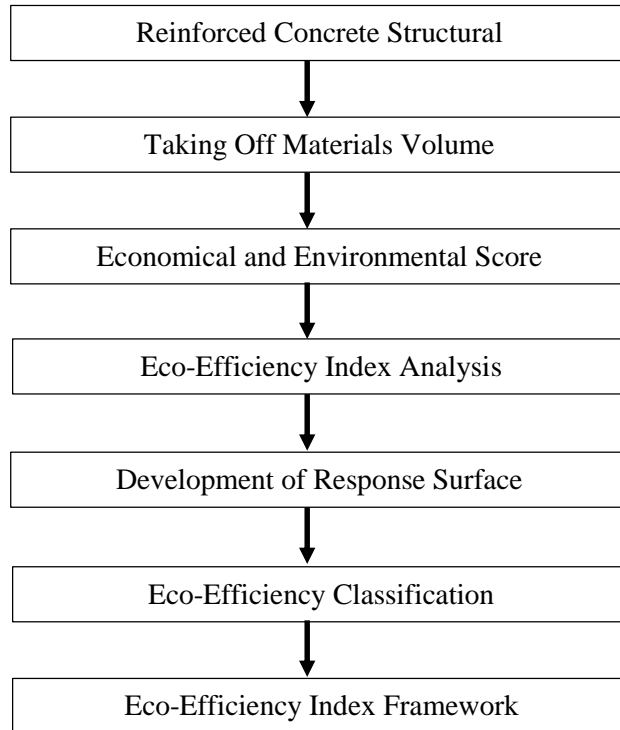


Figure 1. Methodology of Development of EEIR

3. RESULTS AND FINDINGS

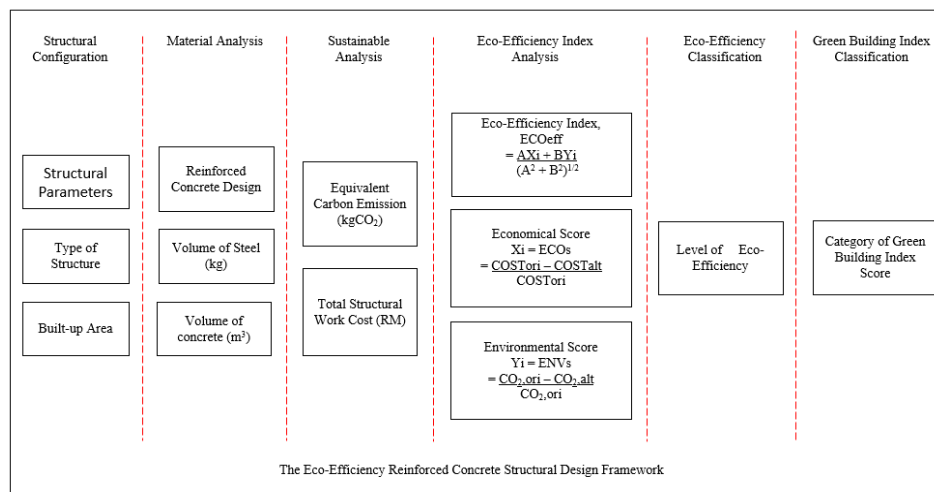


Figure 2. Eco-Efficiency Index Framework (EEIR)

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