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## Optimization of sustainable house in urban area

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### Abstract

The growth of time demands human to evolve needs. House as a primary needs is inseparable from the development of human life needs, especially in urban areas. The phenomenon of urban houses requires architects, developers, and even residents to be able to plan and collaborate in considering needs and limitations of land use. Humid tropical climate condition is a challenge for the planners or architects in creating indoor condition of the building that is eligible for dwelling. This paper aims to describe a simulation of interior arrangement to proving a design of efficient energy houses. The houses in urban areas are density houses with diverse environmental situations including density environmental housing and real estate. The identity of urban houses is characterized by inability to organize a dense interior space. Therefore, the requirements of comfortable and healthy dwelling are not fulfilled properly. The efforts to develop efficient energy, environmentally friendly and sustainable houses can be done through optimization approach of architectural design. The purpose of optimization is to find answers for possibilities of architectural design problems in order to obtain the best solution. The method of this research has been done by field observations to determine the pattern of spatial planning in several houses in Medan. In the process of model optimization, a possible improvement of existing dwelling model is designed through cyclical and analyzing planning, and alternative solutions that are sustainable and affect each other. The results of this analysis are expected to be a benchmark for local architects, researchers, and also residents in developing design optimizations, especially houses that have been built. This paper is a further research related to model developments of houses for urban community in Medan. Through an appropriate alternative interior arrangement, this research is expected to achieve the optimum design of houses based on the character of the urban environment without losing its identity as dwelling.

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## 1. Introduction

Medan is one of the five largest major cities in Indonesia. It can be clearly seen by the area and the rate of urban growth that is rapidly increasing. This rapid development is obviously viewed on the economy, population, and also the availability of facilities and infrastructures of the city. The developments in urban areas continue to grow sustainably and relentlessly. The growth of urban areas should be carefully managed and sustainable by considering factors of politic, economic, humanity, nature, and environment. The development activities, however, should be able to modify the situation of the city that is safe, comfortable, well-organized, as well as environmentally friendly to maintain the quality of the city.

The direction of development of Medan, recently, has followed modern economic and technological growth, the rate of population growth and urbanization pattern. This direction brings significant impacts on the ways of thinking and behaviors of society. As an example, the construction of urban facilities that is more increasing such as shop houses, shopping centers and entertainments, hotels, restaurants, housings, and offices causes a shift in the social life patterns and public mindsets, from conventional to modern. The increasing population of the city creates the conditions for an increasingly dense city and the growing demand for property. The problems are that the property development is often not able to accommodate aspirations of the community and is impressed to ignore applicable building regulations. House as the smallest environment of city is often affected by the increasing development of the city. On one side, houses are commonly located in dense and unhealthy environment, and on the other side, there are also other residential houses that have better environmental arrangements. Dwelling-settlement conditions should be a concern for policy makers of the city in which applicable regulations can be applied properly without neglecting human factors. It is due to all city residents have their own right to acquire a qualified life. In addition, the development of environmentally friendly and sustainable city is an effort to improve this condition.

The connection between architecture and sustainable concept is to create spaces of human life that are safe and support the physical and psychological developments of each human [1]. Based on viewpoint of tropical architects, the consideration of nature and environmental conditions has been discussed in the realm of architectures, particularly in Indonesia. Architecture in Indonesia should be planned by considering of ecology, utilization of natural resources, and environmentally friendly process during building operations. However, many architects ignore the sustainable rules in creating a built environment and also there is a lack of political policy in this field. It is related to low-level awareness of individual and government stakeholders on the issue of sustainability. Moreover, the arrangement of the city and region has not been integrated causing not to implement sustainable cities. Approaches of architectural design, nowadays, have been combined into several discussions- selection of the area, energy efficiency, water conservation, material resource efficiency, optimization and sustainability of design, and environmental quality in the building. Consequently, it is strongly needed to be done more intensive approaches to create built environments that are qualified, optimal in design, and sustainable, primarily on housing of the city with all existing problems.

## 2. Methodology

The method of this research has been done through observations in public housing. The objective of this study is to analyze the pattern of design in some houses in Medan. Because of limited discussion, this research only focuses on a house representing houses in settlement area of Medan city. Data is collected by study observations, documentations, sketches of houses and settlement areas, and also the data of potential land and local climate conditions. The obtained data is analyzed to identify positive and negative potentials in order to conclude any problems of the existing houses as a whole. The result will be emphasized by analytic description approach explained by sustainable ideas as an effort to optimize efficient energy and environmentally friendly house. In the process of model optimization, a possible improvement of existing dwelling model is designed through cyclical and analyzing planning, and alternative solutions that are sustainable and affect each other. The results of this analysis are expected to be a benchmark for local architects, researchers, and also residents in developing design optimizations, especially houses that have been built.

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