BIM-Based Model of Energy Analysis Heating and Cooling Loads for Residential Building in Egypt

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Abstract:

Sustainable construction is the most important requirement of the modern era in all the different fields that the world needs today. Previous studies began to improve the work of BIM technology in energy analysis, as these programs were not limited to drawing the building in three dimensions, but rather to studying and predicting the building's behavior in heat, lighting, and natural ventilation. Therefore, using BIM technology in the building and construction process is recommended by experts and researchers to save time, and costs to improve energy efficiency that affects buildings and users. BIM is one of the most important technology requirements of projects in general and all engineering disciplines, as the world was affected by Covid-19, which led to the deterioration in the global economy; therefore, governments and institutions resorted to using technology for Online communication. Projects are affected by time and cost as a result of the various factors facing the world today in rapid changes, this led to resorting to the use of BIM in projects to reduce the environmental impact of pollutants and increase the proportion of carbon dioxide (CO_2). The research presents using of BIM technology from simulation programs in social housing that was implemented in Egypt, which was built in traditional materials such as steel and concrete, without using appropriate solutions that reduce energy consumption. Also, it presents BIM technology from simulation programs in social housing that was implemented in Egypt, which was built with traditional materials such as iron and concrete without using appropriate solutions that reduce energy consumption. The study presents the selection of residential projects implemented in Egypt at one of the housing levels, which is social housing, which suffers from a lack of efficiency and sustainability in the building. Therefore, BIM programs such as Revit Architects were used to create a 3D housing model, then use the simulation software Insight 360 for Revit to run and analyze simulations such as sun trajectory, and solar analysis, and calculate heating and cooling loads through appropriate solutions. Therefore, the use of BIM technology helps in developing suitable solutions or alternatives such as; insulating materials and the quality of glass that allows accessing natural light only to achieve thermal comfort to achieve heat efficiency and reduce thermal loads, cost, and time.

Keywords:

Building Information Modelling; Energy Efficiency; Energy Simulation; Sustainable Design