A Building Information Modeling Platform for Modular Construction

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Outcomes: 2 conference papers

Background

Modular construction and prefabrication in the Architecture, Engineering, and Construction (AEC) industry is a growing trend. Based on the McGraw Hill Smart Market Report, the size of this industry expanded by more than 50 percent in five years from 2006 to 2001. Many components of buildings can be prefabricated, whether or not the project is truly modular in nature. Modular buildings (made up of volumetric modules) share about 42% of the prefabricated building industry in North America, which has about 2.1 billion dollar annual revenue. With increase in the number of stories, the construction method and engineering issues become more complicated. Although interest exists in multi-story low-rise, mid-rise and high-rise modular construction, in particular in urban and metropolitan areas, there is a serious lack of well-developed methods for design, manufacturing, and construction of such multi-story constructions.

Research Vision and Goals

The primary goal of the proposed research is to develop a BIM platform framework to encourage and improve design and construction of mid- and high-rise buildings using factory-built modular units. Doing so would provide the industry with more options for economical, energy efficient, sustainable, and more affordable construction. The goal will be achieved through accomplishing several objectives that are also bound by a global holistic multidisciplinary approach considering information technology, design frameworks, and principles of different engineering disciplines. To have cohesiveness in the modular BIM platform, the research must take into consideration the relationships of these principles. Figure 2 depicts the main three objectives of this proposed research, which address the product architecture, lifecycle BIM framework, and engineering analysis of the modular buildings.

To meet the goal of this proposed study, the research team as developed three main objectives that must be studied and completed successfully for this study to be an advancement in the modular sector. They are:

Objective 1: Develop a Product Architecture Model based on conventional modular systems.
Objective 2: Develop a modular buildings lifecycle BIM framework.
Objective 3: Develop a mechanism for information interpretation using open standard data schema.