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Thesis topic: Integrative Design and BIM

Thesis title: Benefits of integrative building design for their sustainable construction and operation using the BIM method

Abstract

The integrated design concept applied to Buildings has been developed conjointly by chartered architects and engineers to wear some limits and drawbacks (such as lack of collaboration between construction professionals and contractors, etc.) encountered with traditional design processes, which relied on separated and uncoordinated designs by different professionals involved in the project [1]. Indeed, the major asset of integrated building design resides in its ability to gather together construction professionals around a multidisciplinary approach enabling, based on a holistic approach, to create a project with centralized information allowing flexible interoperability and real-time coordination and communication between all parties involved in the project. In the common practice, the deployment and implementation of the integrated building design are made using Building Information Modelling (BIM) [2] which is a numerical and virtual computer model of the project enabling to create, modify and manage digital information for the design, construction, operation and maintenance of built assets during their life-cycle.

Research Objectives

- Show that integrated design and BIM method improve the quality of design.
- Propose study documents for integrated approach in architectural design of sustainable buildings.
- Establish a process for using the BIM method to produce sustainable construction.
- Establish a process for using the BIM method for sustainable construction management.

Research Questions

Due to climate change challenges and the growing need for governments and investors to optimize their investments for sustainable construction one question arises: *What is the real benefit of the integrated building design using BIM technics on the cost and the sustainability of built assets?*

Literature Review

The conceptualization of integrated building design has been significantly improving in the last two decades in both the academic and professional senses [3] [4] [5], to augment the modularity of the construction phases and end up with green and energy-efficient construction [6] [7]. The usage of BIM methods to implement Integrated Building design has come with several advantages which are generally viewed from BIM dimensions [8]. Firstly, while 3D BIM encompasses 3D objects (with their properties) that spatially define the project, 4D BIM is its enhanced model with time as an added dimension (it is thus possible to make 4D scheduling of the project over time). Then 5D BIM adds the cost as a supplementary dimension to the former dimension. More recently, 6D BIM has been introduced to tackle facility management and sustainability [2] of the built assets. Therefore, based on previous research works, we aim to make use of the 6D BIM method applied to integrated Building Design to address the main question of the current topic as discussed in the methodology hereafter presented.

Methodology

Literature review and data collection

Case study: Modelling a project using the BIM process and carrying out the possible simulations to achieve a sustainable project. (Quantitative)

Investigation of expert users of the BIM method and comparative study between two projects, one of which is designed within the scope of the integrated design process and the second only based on conventional technics (separated design). (Qualitative)

Analysis of results

Proposals

References

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