

Applications of BIM Technology for Interior Decoration in Practice

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Abstract:

Usually, the use of constructability review is implemented based on 2D CAD drawings in the interior decoration. There are many limitations and practical problems (such as the errors in assembling) regarding the communication and discussion using 2D CAD drawings. The main purpose of the study is to propose the approach for improving communication and discussion using building information modeling (BIM) technology in the interior decoration. The proposed approach includes BIM-based processes and methods for visual constructability review and communication during the construction phase. The proposed approach is then applied in selected case studies to demonstrate the effectiveness of communication and discussion in the interior decoration project during the construction phase. This study identifies the benefits, limitations, conclusion, and suggestion summarized for further applications in practice.

Keywords: BIM, building information modeling, Interior Decoration, constructability review, construction phase.

1. INTRODUCTION

For modern people, under the promotion of home's preference, the quality and uniqueness of interior decoration are more important, thereby, the change degree is increased recently, with the ongoing project, due to the procedure and the step of installation are complex, many demands should be conducted based on the proprietor's needs, thus to customize the review of the implement and construction performance. If people only use the two-dimensional (2D) CAD drawing to communicate and review, it will easily cause the error cognition and misunderstanding, procedure of construction site without the standardized process, quality cannot be controlled easily and as expected.

Nowadays, through the building information modeling (BIM), it can apply to the characteristic of a building's life cycle. Using BIM as the method not only solve, coordinate and plan the order of the construction during the construction phase, but also reduce the heavy industry burden, the waste of time, and the damage of the cost of the materials. Also, with the aid of two-dimensional and three-dimensional drawings, we can reduce the weakness of the diagram caption and shorten the time to understanding of the drawings. With BIM technique, we can integrate the detailed elements, construct the review of the constructability, and promote the visualization of the construction phase, the communication method and the review of construction performance. Finally, this study identifies the benefits and limitations, and suggestions are summarized for further applications in practice.

2. LITERATURE REVIEWS

The benefits of BIM have been recognized in the industry, and numerous design firms and contractors reported the benefits of using BIM in their projects. BIM is a design and construction software that manages not just graphics, but also information—information that enables the automatic generation of drawings and reports, design, analysis, schedule simulation, facilities management, and cost analysis—ultimately enabling any building team to make better-informed decisions. This allows a range of professionals—architects, engineers, construction managers, surveyors, cost estimators, project managers, and facility managers—to share information throughout a building's lifecycle. BIM is now recognized worldwide for the efficiencies it delivers in terms of working collaboratively, communication, processes, cost savings, and a property lifecycle management (Holzer, 2015). BIM is beginning to change the way buildings look, the way they function, and the ways in which they are designed and built (Eastman et al, 2011). There are many definitions of BIM, but it is simply the means by which everyone can understand a building through the use of a digital model. Modelling an asset in digital form enables those who interact with the building to optimize their actions, resulting in a greater whole life value for the asset (NBS, 2014). BIM is an intelligent model-based process that provides insight to help you plan, design, construct, and manage buildings and infrastructure (Autodesk, 2014). When E-commerce and Building Information Modeling can be used together, the self-help decoration mode can not only meet the requirements of social production to increase productivity, but also help consumers live ideal residential (Ma et al, 2015).

A constructability program is the application of a disciplined, systematic optimization of the construction-related aspects of a project during the planning, design, procurement, construction, test, and start-up phases of knowledgeable, experienced construction personnel who are part of a project team. The program's purpose is to enhance the project's overall objectives. For purposes of this paper, the terms constructability and constructability program mean the same thing (ASCE, 1991). Constructability, means and methods, and project construction feasibility all refer to the evaluation of whether the design can actually be built by a construction team and how it will be done, to determine just how a project is to be constructed and the site orchestrated (Hardin, 2009). Previous research demonstrated the feasibility of an automated, rule-based constructability review through BIM implementation. The current work investigates the elicitation of constructability knowledge to achieve the automated process (Jiang et al, 2014).

Related literature review was conducted to identify relevant applications of BIM, as a job site constructability review of research basis.

3. RESEARCH CONTENT

This section is to identify applications of BIM technology in interior decoration. In the study, BIM engineer simultaneously proposed procedures and responsibilities of each person, discuss to formulate an applications course of events of BIM technology for interior decoration.

In BIM introduced into an interior decoration project can be divided in the application panorama visualization, clash detective, construction sequence review, interface review, custom modification and alternative selection six items etc. (see Fig. 1).

The BIM model with 3D feature, panorama visualization of the presentation, join different parametric design, enhance the overall visualization, and thereby confirm compliance with expectations. The BIM model with 3D feature, panorama visualization of the presentation, join different parametric design, enhance the overall visualization, and thereby confirm compliance with expectations.

To determine the phases of work that you want to track for review and implement the items, and create a phase for each model, build construction steps, simulation facilities for procedures, 360-degree viewing angle function of the switching model and interface review.

BIM model can communicate and review the implementation of the platform, provide a choice of different alternative selection and custom modification, shorten spend time communicating and review, strengthen engineering quality improvement.

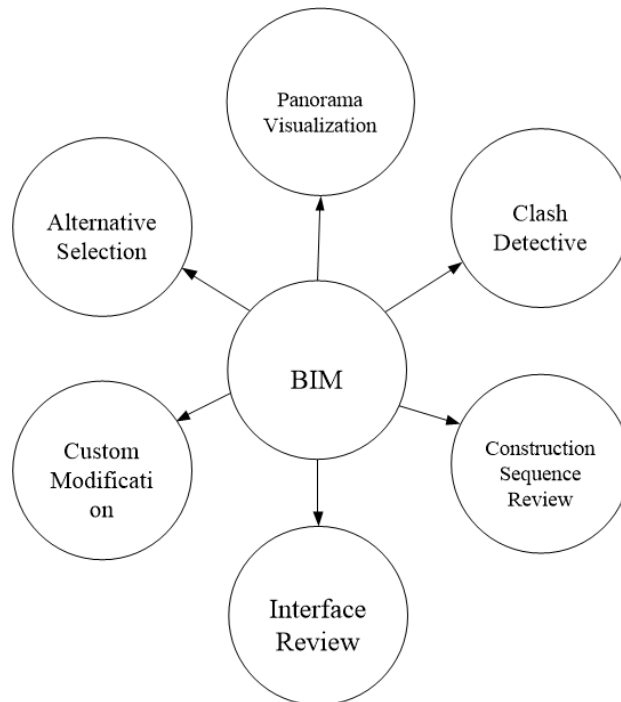


Figure 1. BIM uses the interior decoration of different.

During the BIM application process, project participants include owners, project manager, on-site engineer and BIM engineer. Responsibilities of participants are listed in Table 1.

Table 1. Participants responsible for the work items.

Participants	Work items.
Owners	<ol style="list-style-type: none"> 1. To put forward need and expectations. 2. To finish acceptance.
Project Manager	<ol style="list-style-type: none"> 1. To overall project management by objectives, working hours and milestones. 2. To for the work items between participants and make communication and coordination. 3. To review BIM import process meets expectations.
On-site Engineer	<ol style="list-style-type: none"> 1. To on-site engineer for the inheritors of construction technique, propose a review of the need to enhance the constructability of the items and execution processes. 2. To view the model of the build process and the interface meets the needs of the site to review and process.
BIM Engineer	<ol style="list-style-type: none"> 1. To develop a BIM model and check model items. 2. To assist BIM model in the job site communicate and review applications. 3. To assist of using the BIM model to follow-up management and application.

Discussion in this section of the process of constructability review, for the owners of the proposed interior decoration needs and problems, through the meeting, proposed by the project manager to import BIM's direction and objectives, jointly co-participants set the application mode and classification of each project, project managers and field engineers set to work after the situation with the various stages of the items, BIM engineers in accordance with the different stages of target model building, and identify the level of development (LOD) of BIM model based on the requirement. The construction sequence and information established in the model, BIM engineers and on-site engineer together check whether the model meets the needs of the job site communication and applications, confirm model in line with expectations and solve problems raised by owners, finally, the model applied to the job site or do a follow-up of management and application, BIM introduced therein will be executed and set application guidelines (see Fig. 2).

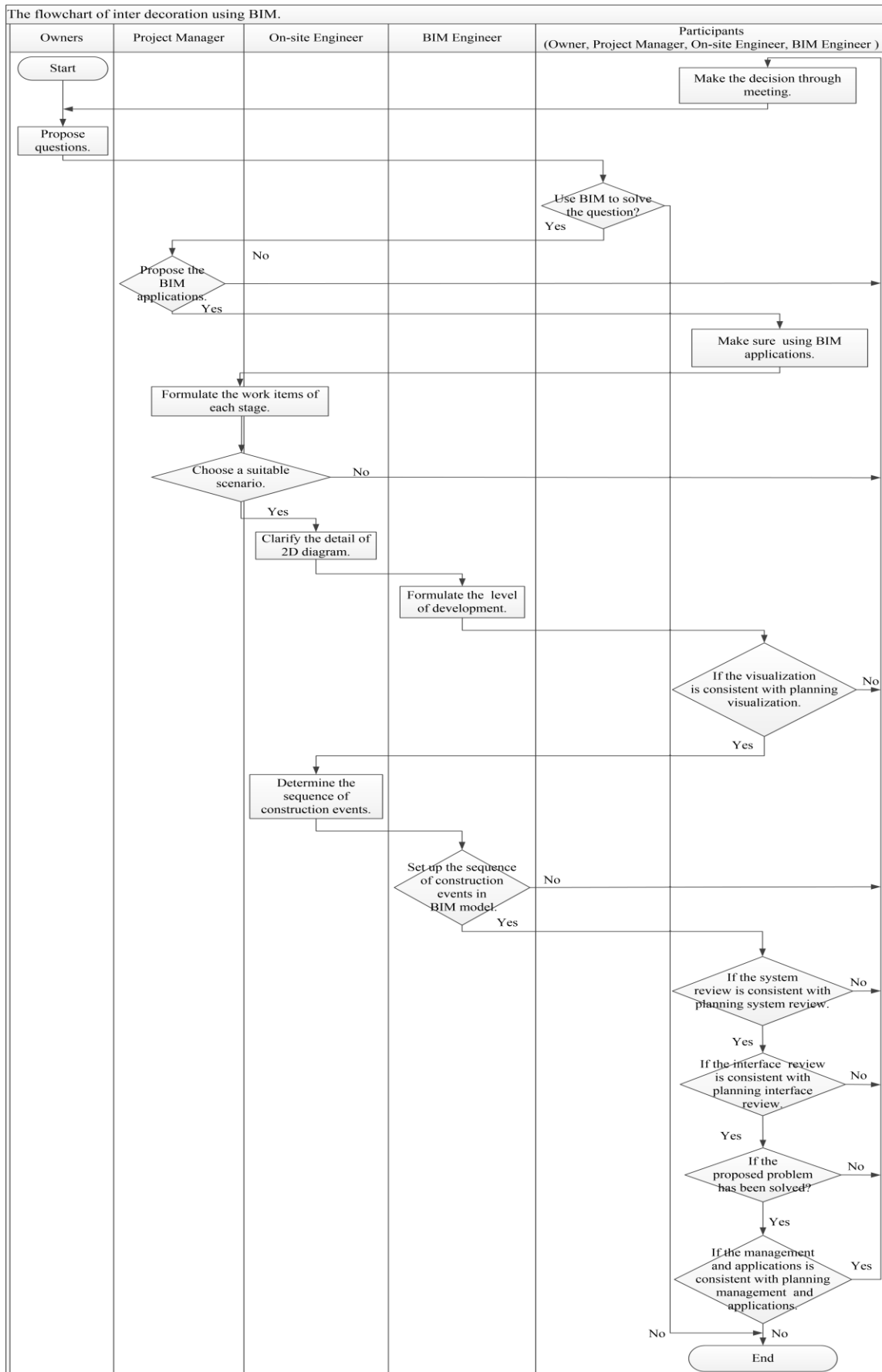


Figure 2. The flowchart of inter decoration using BIM.

4. CASE STUDY

Required for the items to establish the interior decoration of many types, plus the choice of customizing is more diversified, but interior decoration is still the most common using metal framing to assemble and install, usage is more frequent.

No using BIM in construction, when the metal framing to assemble and install, construction workers vulnerable to the income side of the interface and the joint facilities for not careful enough, material loss, poor quality, reduced life situations to occur.

Nowadays, through the BIM solve to the job site construction inconsistent, discuss the most frequently ignored detail, using the 3D model review and application of different items, including the step of reviewing and interface details to enhance the income side of the presentation constructability of the job site. Project participants can be presented through visualization and panorama visualization, to quickly understand the appearance of the finished product, in line with expectations or confirm to be corrected, thereby to enhance the work efficiency.

Applications of BIM technology for metal framing to assemble and install 3D models in addition to showcasing and simulation applications, better communication to enhance the job site and constructability review, and to clarify the 2D map that field engineers and facilities for the program after the model build, using the create phase approach of construction will be divided into eight-step program builds on the model, include of layout, u-channel to assemble and install, c-runner to assemble and install, strengthen channel to assemble and install, drywall to install, for fiberglass insulation of installation, finishing drywall joints. (Joint compounds.), decorative drywall finish (see Fig. 3).

3D model of the various stages of the construction process builds complete after, on-site engineer and job site personnel of the discuss the use of model facilities for the various stages of process, unified facilities for steps to review the process and enhance the quality of detailed content. Owners presented the appearance and condition of understanding after construction is completed through visualization, 3D models, heavy substantial reduction of errors and status.

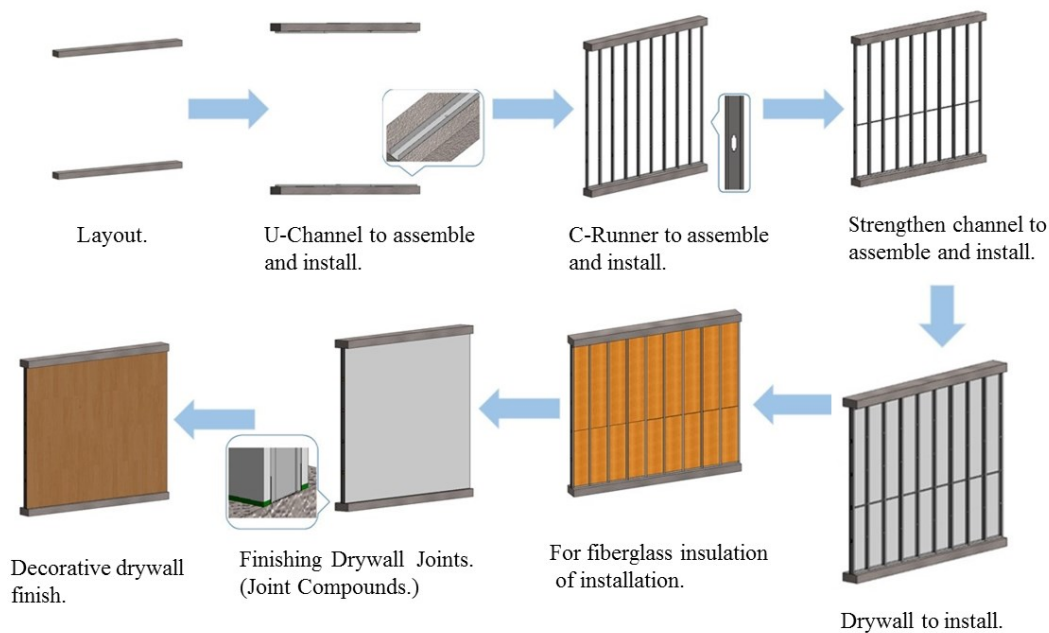


Figure 3. Metal framing to assemble and install.

Using BIM have 3D model visualization function, first build the model and join the spatial planning and finishing material in the model after the reach to owners' needs for level. Visualization of the model will be build rendering, completion of the link to the image panorama visualization (see Fig. 4 and Fig. 5).

The model uses a whole panorama visualization map of the show, 360 degree view rotation, project co-participants and faster help understand the overall expected, when communicating more quickly, thereby enhancing finishing productivity (see Fig. 6).

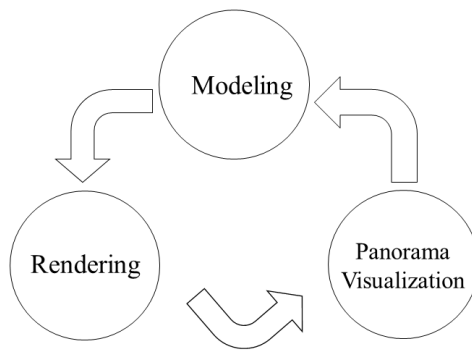


Figure 4. BIM model into a Panorama Visualization of the program.

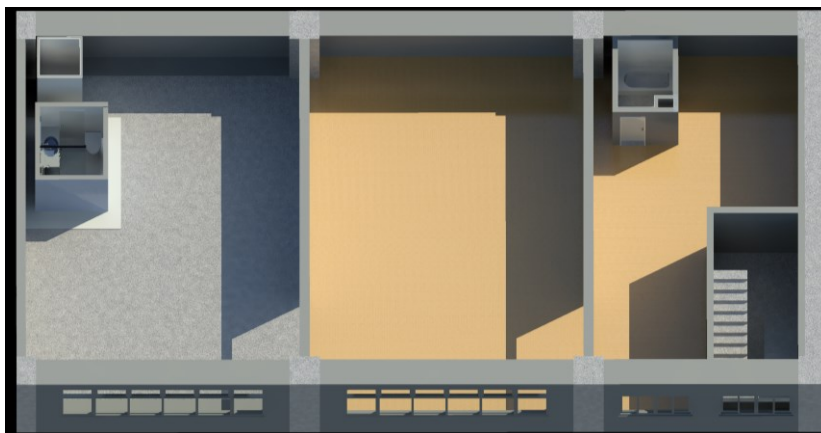


Figure 5. The use of rendering visualization in the case study (1)



Figure 6. The use of rendering visualization in the case study (2)

The benefits bases on the case study are summaries as following:

- The display of 3D model can deliver the 2D showing drawing to make job site personnel clarify the diagram more quickly and to reduce the misunderstanding.
- Increasing the technical level of construction and a lot of customization requirements lead we need to use BIM to promote the communication and constructability of the job site.
- Through the dynamic form of working order, the display model could supply the constructability review, promote the construction course, standardize the quality, and reduce the misunderstanding coming from the 2D diagrams or dictation.
- Through the dynamic form of working order, the display model could supply the constructability review, promote the construction course, standardize the quality, and reduce the misunderstanding coming from the 2D diagrams or dictation, instead of the Mockup in construction site, the 3D model show the interface to reduce the non-necessary cost.
- After introducing the BIM, build the model and instance, according to the requirements, these build the model and instance are not only used to do the interface review, visualization and communication, but also the knowledge assets as employee training and working experience transmissions of the company.
- The model has visualization characteristic, using models of the owners to see accomplish appearance, communication and discuss, to avert circumstances they happen not as good as expected, overlapping projects, cost overspend and materials wear and tear.
- Panorama visualization view using of the whole space in job site, even without BIM preview platform, also can to communicate with the discussion, reduce restrictions and difficulties on the using, fast settling information communication platform.

5. CONCLUSION AND SUGGESTION

With the assistance of BIM technology, we propose the benefits and difficulties for applications of BIM technology for enhancing constructability review in interior decoration. Finally, conclusion and suggestions, difficulties and limitations are proposed for further applications in practice.

The conclusion are summaries as following:

- The model build process, BIM engineers and owners confirmed through meetings with the demand, but also need to communicate with on-site engineers, discussion, make the model modify or build process can be more in line with on-site applications items. The modeling builds complete model should be self-check model, follow-up is inspected by engineer once again, and to ensure the correctness of the model, to avoid the error information communicated to owners or staff construction in the job site.
- BIM import interior decoration of the Improve efficiency, before establishing a model, needs sure what wanting you to use the model? Build the model in against items and upgrade in the LOD level.

The difficulties and limitations are summaries as following:

- For modern interior decoration needs customize majority proportion, many of the models and instances are customized, make the long time in the build models, can be repeated use was a small, overall improvement in probability is not obvious, increase the degree of difficulty in the using BIM.
- Interior decoration items to diversify, many of the models are all customized. Build the model is able to meet the instances, will take some time build and accumulate.

The suggestions are summaries as following:

- Due to the habits of Taiwanese, if the job site immediately all import BIM, its benefits will not necessarily special highlight, first strengthen education, training and available at the time to import BIM application and the original work habits with on-site engineers, benefit to give prominence to using BIM.
- Because the period of decoration project is in a hurry, we need to construct the details of the deployment and application of the model to collocate with the requirements of the job site and do the review, in order to increase the efficiency of using BIM.
- The BIM model includes the feature about information, so we can enhance scheduling management in the future.
- First, build the model are creating an in place mass, and then follow-up accordance with section build

more detail of the review items, could be shorten build time and benefit to give prominence.

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