

## **A BIM-based Study on the Comprehensive Benefit Analysis for Prefabricated Building Projects in China**

The authors are grateful to the two reviewers for their insightful suggestions and constructive comments, which have greatly contributed to improving this paper. The authors have seriously considered all suggestions. The authors have revised the manuscript in accordance with the reviewers' comments and highlighted the changes in red. More specifically, please find the response to each comment as follows.

### **Response to the 1st reviewer**

*The research method fits with the objectives (a case study). It is well structured and includes enough references.*

*However, there are some issues that are not clear in the document and that are listed below:  
Tax exemption could be connected with sustainable performance and good practices and these are able for PRB & TRB.*

Responses: The authors have checked the official websites and documents provided by the local government. The explanations have been added in Section 5.1.3. At present, the tax exemption is only available to prefabricated building projects, which are checked and verified by local governments in terms of building area, assembly rate, structural characteristic and construction technology in China. Thus, tax exemption is only available for the verified PRB projects, while other sustainable construction projects, such as green buildings, are stimulated by means of financial subsidies.

*Are all the result exactly the same depending on the size of the site?*

Responses: The comprehensive incremental benefit and its economic components are not directly depending on the size of the site, but related to the project scale. This is because the benefit evaluation of saving resources mainly relies on materials and other resources consumed by machines. The benefit evaluation of shortening construction time is determined by the project progress, and the benefit evaluation of receiving policy subsidies is related to building

size and application situation of prefabricated construction technologies. The explanations have been added in Section 5.2.

***What about economies of scale?***

Responses: The authors have added the explanations related to effects from the economies of scale in Section 5.2. For example, the comprehensive economic benefit of a PRB project is often positively correlated with its scale. Increasing the project scale is capable of promoting the economic benefit. From the resource-saving perspective, the larger floor area means that more building components are fabricated and more construction materials, such as formwork, are reused in manufacturing factories. A larger floor area also means that more building components, such as exterior walls, are prefabricated, and thus the on-site construction progress can be more significantly accelerated. Equation (3) also indicates that the subsidies and rewards are related to the project scale.

***Equation (1) includes a lot of coefficients that are not justified.***

Responses: The authors have revised Table 1, which is used to justify the coefficients of Equation (1). More explanations have been provided by the authors in Section 4.2.

***Have all the figures been created by authors? In this case, it will be interesting to include the note.***

Responses: All the figures have been created by the authors, and additional notes have been added to the captions of Figures 4-6 as further explanations.

***Figure 10 is not well explained. What is the origin of the data?***

Responses: The data of Figure 10 has been provided in Table 6. More details have been provided in Section 5.2 to explain Figure 10.

### **Response to the 2nd reviewer**

*The paper aims to evaluate the economic benefits of implementing prefabricated construction in China, all of this with a case study and using Revit (BIM software).*

*The paper is interesting and useful, and it has a updated scientific literature. The conclusions are endorsed by the results.*

*Nevertheless, the manuscript should be corrected with the following aspects in mind.*

*Section 2 (Literature Review): The authors should indicate if the used de prefabricated elements have other benefits, for example, health and safety in construction site.*

Responses: The authors have added more details related to other benefits such as safer construction environments, faster construction progresses, enhanced quality outputs, and less labour rework on site. Specifically, construction schedule can be significantly shortened as a large number of construction activities can be automated and finished in manufacturing factories. The indoor built environment also contributes to improved construction safety, and construction activities with high health and safety risks can be effectively reduced or even avoided on construction sites (Fard et al., 2017). In a factory-controlled environment, there is less risk for problems associated with moisture, environmental hazards and dirt, and there are strict factory processes and procedures that protect workers from on-the-job injury (Generalova et al., 2016; Franks, 2018; Hwang et al., 2018). Furthermore, prefabricated building modules can be designed and fabricated with requests of clients to meet living comfort requirements (Vieira et al., 2017).

#### **References:**

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- Generalova, E. M., Generalov, V. P. & Kuznetsova, A. A. (2016). Modular Buildings in Modern

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***Pag 4, second paragraph: It is necessary to add a link to introduce BIM concept (for example, Furthermore)***

Responses: The authors have added a link to introduce BIM concept, i.e., “In addressing these challenges, Building Information Modelling (BIM), as a digital model-based process, emerges as a solution to rapidly simulate and identify the economic impacts of different construction techniques.”

***The authors must add a methodology section for a better understanding of the paper.***

Responses: The authors have adjusted the structure of the manuscript, slightly modified Equation (1) and changed the position of Table 1. The methodology section has been established in Section 3. Section 4.2 is used for data pre-processing in terms of the selected case.

***The authors must add Revit reference.***

Responses: The authors have added the Revit reference in Section 4.1 and briefly introduced the reasons why the Revit BIM platform is adopted in this paper.