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Design Quality Improvement through openBIM-based Design Certification Automation Evaluation Support

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Session Chair : Yoemun Yun(Chungwoon University, Korea)

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Abstract. To proceed with BIM-based design certification automation evaluation, design certification evaluation items and BIM data system are analyzed to develop automation evaluation technology, and designers, the main user, conduct preliminary evaluation at the design certification stage to prepare design changes and evaluation reports. It is possible to increase work efficiency, and reviewers can reduce time and prevent human error through automated evaluation technology for vast design data. In addition, to proceed with accurate evaluation, it is necessary to increase the completeness of automated evaluation through BIM data standardization, and to build a modeling guide and BIM data system for design certification for program versatility.

Keywords: Building Information Modeling (BIM), Design Certification.

1. Introduction

Along with the growth of the 4th industrial revolution, the application of BIM in the construction industry is increasing process efficiency through new working methods, and is developing into various fields of smart construction, such as increasing productivity by reducing information uncertainty. The government presents a vision of 'transforming the architectural digital technology paradigm and enhancing the competitiveness of the construction business' and aims to make BIM orders mandatory. As the technological development of the construction industry enables various designs and the size increases, the amount of information and time for evaluation are increasing. The scope of application of design certification is being expanded with the revision of design certification, and items and conditions for evaluation calculation are being strengthened. Unlike the development of construction industry technology, the design certification evaluation method is being conducted based on the existing 2D method, and in some cases, evaluation through BIM is being prepared. It is a reality that additional work is required even if the design is in progress. To achieve the goal of mandatory BIM ordering, the need for measures to use BIM-based data is increasing in the design certification and approval stages, and active research is being conducted to promote BIM, such as research on BIM data

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standardization and building a Korean BIM standard library. It is becoming. In addition, as artificial intelligence-based architectural design automation technology development research is progressing, it is contributing to the mandatory BIM by undergoing trial and error using the 4th industrial revolution technology and BIM data.

2. BIM-based design certification automation evaluation

2.1. BIM shape evaluation

To apply in the existing BIM-based system, it is necessary to classify the calculation criteria of evaluation items. Among automated analysis methods, shape analysis is sometimes required in addition to BIM data. To evaluate whether the available space is secured in front of the elevator door, shape analysis was prepared in order. Search all elevator objects in BIM design data. Then, find the door of the elevator object, make the center of the door a virtual line, and create a virtual utilization space of 1500mm x 1500mm vertically with the virtual line. Also, check if there are any obstacles that interfere with the inside of the utilization space. If there is no object included in the virtually created utilization space, an evaluation suitable for the calculation standard is conducted. Depending on the type of design certification, the rate of shape-based evaluation and property-based evaluation is different, but the ratio of the shape-based evaluation part may inevitably be higher than the attribute-based evaluation part.

2.2. Development of BIM-based design certification evaluation system

The design certification evaluation methodology is analyzed, the BIM data utilization method and automated evaluation process are established, and the verification work is carried out through the development of a system capable of automated evaluation based on the application method of evaluation calculation criteria and evaluation results. It is the evaluation result screen of the system developed in the design certification automation evaluation study. Through the system, it is evaluated whether the space to be used in front of the elevator door is secured, and finally, the result can be automatically documented according to the evaluation form. By establishing a methodology and evaluation process for automated evaluation of BIM-based design certification, research and development of an automated evaluation program for design certification using BIM design data is under way. We are continuing to work on improving perfection. In addition, the final grade is evaluated in advance by statistics of the evaluation grade and score for each calculated item in accordance with the design certification report of the automated evaluation result. Through pre-evaluation for design certification, it is possible to search for design changes and respond quickly, shorten report preparation time, and expect accurate design certification evaluation effects.

3. Conclusion

In the field of architectural design, BIM enables 3D-based design as a design tool, which has the advantage of high process efficiency through a new working method,

and is used in various fields through data-based technologies such as data analysis and simulation using building data. By utilizing object-based data of BIM, information necessary for design certification evaluation can be extracted from BIM data in the design certification stage, and BIM-based design certification automation evaluation is possible by comparing certification evaluation information and BIM data.

To proceed with BIM-based design certification automation evaluation, design certification evaluation items and BIM data system are analyzed to develop automation evaluation technology, and designers, the main user, conduct preliminary evaluation at the design certification stage to prepare design changes and evaluation reports. It is possible to increase work efficiency, and reviewers can reduce time and prevent human error through automated evaluation technology for vast design data. In addition, to proceed with accurate evaluation, it is necessary to increase the completeness of automated evaluation through BIM data standardization, and to build a modeling guide and BIM data system for design certification for program versatility. It is expected that design work efficiency and design quality can be improved by supplementing automated evaluation technology through continuous research and utilizing BIM data in various ways in the design stage.