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Development of a Matadata-based Green Building Information Management System for AEC Industries

Minho OH[1] , Se Young LIM[2,] Yong Hee KIM[3] and Tae Dong LEE[4]

Abstract: *Green building information used by the AEC industry is diverse and extensive), causing difficulties for personnel regarding the collection and utilization of information in the form of inaccurate searches about related laws, inefficient management of searched information and overlapping works. Therefore, this research aims to propose a law search system utilizing metadata for more accurate and efficient searches of green building information. The proposed system is expected to contribute to improve productivity of construction projects by reinforcing the accuracy and efficiency of searches for the collection and utilization of green building information.*

Keywords: Matadata, Green Building Information, Information Management System, AEC Industries, Big Data

I. INTRODUCTION

Recently, environmental issues have emerged the impact directly on the quality of life, the awareness on seriousness of the environmental problems is increasing. Thus, many countries are starting to concentrate on green industries and technologies in order to minimize environmental problems in diverse fields. Along with this paradigm changes, the AEC industries is also focusing on laws, regulations, and certification about green building. The collection and analysis of environmental information has became a very important task for construction projects. However, There are many problems using the green building information of laws, regulations, and certification such as unnecessary work, low information accessibility, difficult information management due to the different types green building information by region and design phase. Therefore, this study aims to develop a green building information management system based on meta data for reducing the problems

II. LITERATURE INVESTIGATION

In order to construct green environment in the AEC industry green building research has been conducted in various aspects of the information provided such as building applications, certification evaluation items, the institutional approach, including consideration of regional characteristics. For certification of green building, Lee Jong-il (2013) analyzed issues of concentration regarding large-scale buildings such as apartment buildings and conducted the research to vitalize the certification acquisition of small houses. Ga Cham-hui (2012) analyzed overseas cases to provide evaluation items for certification in consideration of regional features, while Kim Jun-yeong (2013) compared and analyzed LEED with the current local certification system to suggest the plan for improvements.

TABLE I
STUDIES ON GREEN BUILDING INFORMATION

Author	Building applications	Certification	Institution	Region
J. I. Lee et al.[1]	o	o	o	
C. H. Ka et al. [2]		o		o
J. Y. Kim [3]		o	o	
K. S. Yang [4]	o			

III. GREEN BUILDING INFORMATION MANAGEMENT SYSTEM IMPLEMENTATION

A. Definition of the required Information

As green building information used by the AEC industry is extensive and varies widely, the information has to be categorized based on purposes. This research looked into the different types of information and its users from actual cases, and came up with the following information categorization standards.
- Building type: apartment house, public buildings, etc
- Task phase: design phase, construction phase
- Project type: new construction, remodeling, etc
- User type: client, designer, engineer, etc
- Information type: regulation, certification, etc

The pieces of information categorized based on standards are applied with codes for developing system, and the need for metadata has been determined in order to analyze inter-relations between data (Table II).

TABLE II
INFORMATION CLASSIFICATION EXAMPLES

code	name	Metadata
ARCH_PRPS_CLSFY_CODE	building type	Y
BIZ_STEP	task phase	Y
BIZ_TYPE	project type	Y
EMPLYR_CLSFY_CODE	user type	Y
ENGEFF_CLSFY_CODE	information type	Y
GRNBLDCER_CLSFY_CODE	information type	Y
LAW_CLSFY_CODE	information type	Y

[1] Assistant Researcher, 8F Baeksang Star Tower 1cha, 65 Digitalro 9-ghil, Geumcheon-gu, Seoul, Korea, minho7349@ecosian.com(*Corresponding Author)
[2] Executive Researcher, 8F Baeksang Star Tower 1cha, 65 Digitalro 9-ghil, Geumcheon-gu, Seoul, Korea, castilla@ecosian.com
[3] Executive Researcher, 8F Baeksang Star Tower 1cha, 65 Digitalro 9-ghil, Geumcheon-gu, Seoul, Korea, kimyh82@ecosian.com
[4] Executive Researcher, 8F Baeksang Star Tower 1cha, 65 Digitalro 9-ghil, Geumcheon-gu, Seoul, Korea, neoart@ecosian.com

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B. Data Structure with Metadata

Information type is the core item for green building information of the AEC industry, and the information is closely related with building type, user type, task phase and project. So this research defined correlations by analyzing relationships between pieces of information and structuralized data. Table III shows the correlation between regulations and task phases.

TABLE III
RELATIONSHIP INFORMATION EXAMPLES

No	Information type (regulation)	Task phase	
		design phase	construction phase
1	Act on the management and use of livestock excreta	o	o
2	Framework act on the construction industry	o	
3	Building act	o	o
4	Architects act	o	
5	Clean air conservation act		o

Metadata has been applied to such structuralized data in order to provide more accurate search results by utilizing diverse search methods and conditions. The metadata to apply is based on information from predefined correlations, and utilize synonyms, keywords, sources and related departments.

C. System Implementation

System has been developed by dividing into the meta management module to input metadata and the user module to facilitate searches for green building information. The metadata management module has been established so that a predefined correlation of information may be applied. By enabling synonyms, keywords and related departments to be entered as metadata, it improved the accuracy of search results. Figure I shows the interface of the metadata management module with project type, task phase and user type entered as metadata to provide green building information for each personnel work.

FIGURE I
METADATA MANAGEMENT MODULE
(A: PROJECT TYPE, B: TASK PHASE C: USER TYPE)

Metadata is utilized as search conditions and compensations when the user runs a search. Figure II

below shows an example of the user module where metadata has been applied as the user's search condition. The user can utilize project type, task phase and user type to search for accurate information needed for the task.

FIGURE II
USER MODULE
(A: PROJECT TYPE, B: TASK PHASE, C: USER TYPE, D: INFORMATION TYPE)

IV. CONCLUSION

This study proposes the method of structuralizing data by utilizing metadata in order to develop a system to provide accurate search results from the massive green building information used by AEC industry. The proposed system can provide the green building information during the construction project in a timely manner for various construction participants, and we expect that the structured information is able to be used as the basis for a variety of fields such as green building legislation related mobile applications and BIM-based regulation check system.

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