

# A Strategy on Performance Assessment Information System of Building Remodeling

Hong Eun Hwa<sup>1</sup>, Kim Gyu Jin<sup>2</sup>, Lee Sang Chul<sup>3</sup>, Lee Jong Sik<sup>4</sup>, Jo Jae Ho<sup>5</sup> and Chun Jae Youl<sup>6</sup>

**Abstract:** This study is designating the scope, in order to establish the information management system of performance assessment for remodeling buildings, to analyze the current status of performance assessment, and to identify technologies and concepts applicable to performance assessment model.

**Keywords:** Remodeling, Performance Assessment, Quality Function Deployment(QFD), Quality Management, TOPSIS

## I. INTRODUCTION

### A. The Background and Purpose of Study

The building remodeling demand for functional enhancements is going up due to the problems arising out of dilapidated multi-housing units. Unfortunately, however, the rules, regulations and systems which were refurbished in response to the necessity of a multi-house remodeling have not been well utilizing so for Japan has already started off the researches on establishing performance indices (or indicators) of parts and subjects of remodeling houses. In case of Korea, although there exist design guideline for housing performance criteria issued by the Ministry of National Land and Transportation, it has not been The study (or research) of required performance indices should be conducted in advance to induce the long life-cycle of buildings and facilitate the continued development of the core-technologies of remodeling. Accordingly, in order to secure high quality remodeling projects. This study intends to identify the basic items for performance assessment suitable to Korean multi-housing units, and to recommend assessment methodology which can evaluate both function and performance based on the designated required performances.

### B. The Scope and Methodology of Study

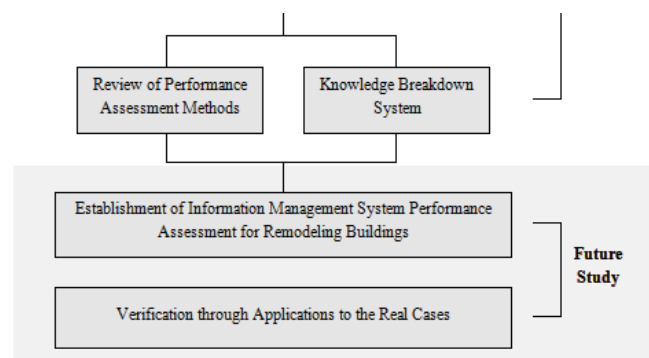
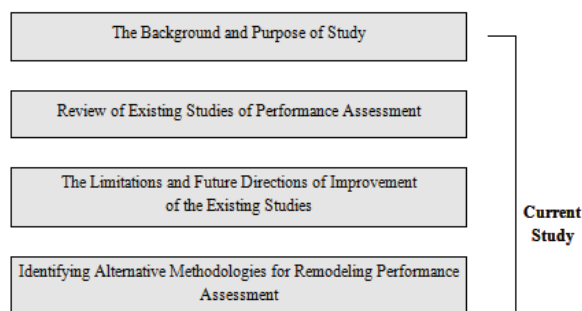


Figure 1. Study Flow and Methodology

## II. REVIEW OF THE THEORIES AND EXISTING STUDIES

### A. The Importance of Performance Assessment for Remodeling Buildings

The assessment works regarding building performances may continue to be done throughout the entire life-cycle of a building from planning, design, construction and operation to demolition. The important thing in the process in that the comprehensive and standardized methods should be used.

If the assessment works are conducted comprehensively with regard to performance and applicability of the remodeling technologies, the outcomes of assessment which can become the parts of knowledge base are able to be used for remodeling works. These methods also enable to induce consensus from residents quickly and objectively in the process of judgement on whether to remodel the houses, the suitability of draft design, etc since they can correctly assess buildings and houses before and after remodeling.

<sup>1</sup>School of Architectural Engineering, Dankook University, [kikihihi0520@nate.co.kr](mailto:kikihihi0520@nate.co.kr) (\*Corresponding Author)

<sup>2</sup>School of Architectural Engineering, Dankook University, [gikim57@hanmail.net](mailto:gikim57@hanmail.net)

<sup>3</sup>School of Architectural Engineering, Dankook University, [Sanglee58@daum.net](mailto:Sanglee58@daum.net)

<sup>4</sup>Professor, Department of Architectural Engineering, Songwon University, [jslee@songwon.ac.kr](mailto:jslee@songwon.ac.kr)

<sup>5</sup>Research Professor, Department of Architectural Engineering, Dankook University, [cjhace@naver.com](mailto:cjhace@naver.com)

<sup>6</sup>Professor, Department of Architectural Engineering, Dankook University, [iaevoul@dankook.ac.kr](mailto:iaevoul@dankook.ac.kr)

Therefore, it is crucial and important to acquire the objectivity of assessment and necessary to have systematic base to share and interface the outcomes of assessment.

### B. Review of the Existing Studies

1) *The Existing Studies related to Performance Assessment:* The studies with regard to performance assessment in architectural field have been vigorously conducted. In domestic basis, the studies have been done mainly by utilizing the existing VE assessment approaches, and researches of remodeling performance assessment targeting toward multi-housing units have also been conducted. The following table represents the major studies done for performance assessment both home and abroad.

Table I. Analyses of the Existing Studies for Performance Assessment

Authors	Publications (Studies)	Analyses of Studies
Han-yeol Kim and 4 Authors (2000)	Study of Assessment Methodology aimed for selection of Optimal Alternatives from Design VE	Non-existence of objective assessment criteria for VE assessment
Secl M. Ahmed, Li Pui Sang (2006)	Use of Quality Function Deployment in Civil Engineering Capital Project Planning	Utilizes QFD model as a tool for assessment of alternatives, and recommends detective management of owner's requirements and ways of communication.
Joong-kwon Lim (2004)	Performance Assessment of Job Plan for the Application of VE to Construction Projects	Lacking ways of expression for enhancing performance, and non-existence of ways of reflecting performance at the stage of functional analyses
Han-soo Lee and 3 Authors (2005)	Study of Improving Design VE by Utilizing Comprehensive Performance Assessment	Lack of assessment methodology for weighted and quantified functions. Only identified simple assessment items.
Yong-hyeon Lee and 1 Author (2009)	Process of Selection of the Performance Items to which Core-Technologies are Applied in Remodeling Housing Projects	Selecting, complementing and systemizing the basic performance items needed for domestic multi-housing units.
Byeong-in Kim and 3 Authors (2011)	Assessment for Airconditioning System of Multi-Housing units by Analysis of Multi-Criteria Decision Making	Lack of objective assessment criteria in the VE assessment methodology
Su-am Kim (2013)	Study on the Adoption of Performance Grade Disclosure System for Remodeling of Dilapidated Multi-Housing Units	Adjusting performance grade items through the verification for the remodeling nature

The result of afore-said reviews indicates that the existing studies on assessment of elementary technology alternatives assessed performances by simply accumulating the total scores of each functions without any criteria which can, through VE approaches, exclusively assess the quality with weighted values of functions and assessment grades.

It appears that the studies afore-mentioned failed to include the precise approaches to performance items, and were lack of quantifiable assessment indices and standardized assessment criteria.

In addition, studies on how to comprehensively assess both functions and performances of building elementary technology were virtually non-existent.

2) *Limitations of the Existing Studies:* When considering the aspect of selecting and applying the elementary technology in the remodeling projects, if the purpose and functions of a remodeling project have been finally fixed, the next stage will be the design phase selecting the most suitable alternative among the concrete technical alternatives which reveal the same and/or the similar performances, meaning to say that the design phase selects the technology not only of higher possibility of performance realization. but also of economic effectiveness. In Korea, however, the knowledge base from which they could refer the systematic assessment methodologies and outcomes of remodeling elementary technology is not that significant so far, and so is the consistency of expressions of the technology.

Being a ware of the importance of performance assessment of the remodeling elementary technology and the necessity of knowledge base, this study intends to suggest the objective and quantifiable performance assessment model for selecting the remodeling elementary technology.

## III. PURSUIT OF PERFORMANCE ASSESSMENT METHODOLOGY

### A. Performance Assessment Approaches

The Performance assessment model for remodeling that this study suggests is the one utilizing QFD based TOPSIS.

Based on the existing performance grade disclosure system, it is the intention of this study to introduce decision-making process to be utilized for the entire phase of a remodeling project. The decision-making process can assess the performance of elementary technologies for each parts and functions of building performance items.

The suggested model may standardize design required performance values which can be the criteria for alternatives through application of TOPSIS concept that assesses the performance based on distance between 0 and 1, and thus further enables the objective and quantifiable performance assessment.

It also make possible to verify the user's purpose and necessary functions objectively. QFD approaches are also applied to this model.

QFD refers to the notion that transform the project owner's requirements into the design quality, and enables comprehensive assessments for performance items of each parts and functions by each elementary technologies through the way of analysing functions consisted of qualities.

Accordingly, this study suggests assessment model which can more correctly compare multiple alternatives based on the user's requirements especially on performances of each parts of the building.

### *B. Knowledge Breakdown System*

The calculated performance assessment values should be data-based to be re-used as the knowledge base of the qualify assessment, which enables the continued managements of operation and maintenance for further remodeling of the buildings.

## IV. CONCLUSION

In this study, in order to secure the quality of remodeling, the current status and problems of performance assessment system are analyzed for establishing the information management system of performance assessment. Through the analyzes, we found that lack of objective performance assessment for the remodeling elementary technologies and lack of knowledge bases are still the problems.

Keeping these problems in mind, this study suggests QFD methodologies based on TOPSIS which enable us to conduct comprehensive assessment for both performances and functions. The study will continue in the future to establish information management system for enhancing quality of remodeling by refurbishing performances of each parts of the building.

The model suggested in this study will be allied to the case with the existing models and comparisons will be made to verify points of improvement.

## ACKNOWLEDGEMENTS

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