

A Study on Measures for the Improvement of the Design VE System

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Abstract. The economic efficiency review of design, etc. (VE) shall target construction with a total construction cost of over KRW10 billion, and shall assess the design VE in the basic and execution design stages in accordance with the Act on Construction Technology Promotion. To systematically and comprehensively manage the results of the design VE and to use such results for performing similar design works, MOLIT has constructed and is implementing the design VE system based on the Guidelines for the Review of Economy of Design, etc. The design VE system, however, is outdated because of the changes that were made in the input items when the design VE guidelines were amended. It currently requires the input of many unnecessary items, and the information is stored chiefly in the form of text, making it inappropriate to utilize the data for designing similar construction projects. This study proposes measures for the improvement of the design VE system to reflect the amendment of the design VE guidelines, to simplify the unnecessary input functions, to boost the search function, and to provide diverse forms of statistics.

Keywords: Construction Project Information System, Construction Project Information Portal System, Design VE, Design VE System, Life Cycle Cost

1 Introduction

VE (value engineering) is the work designed to use the minimum Life-Cycle Cost (LCC) and review the economy and field adjustment feasibility of design contents by function and alternative measure to secure the necessary functions of facilities. Design VE aims to come up with creative measures to ensure the required quality, functions, and cost-efficiency, to enhance the value, in order to reduce the construction costs and improve the quality. [1]

The agencies and subordinate agencies of the Ministry of Land, Infrastructure, and Transport (MOLIT), local governments, and ordering agencies, perform design VE on their own or through outsourcing. To systematically and comprehensively manage the results of the design VE and to use such results for performing similar design works, MOLIT has constructed and is implementing the design VE system based on the Guidelines for the Review of Economy of Design (hereafter, Guideline).

2. Main subject

2.1 Analysis of the Overview of the Design VE System

According to the design VE law, the Construction Technology Promotion Act's Enforcement Ordinance - Article, construction with a total construction cost of over KRW 10 billion shall undergo a design VE review in the basic and execution design stages. In addition, one of the notices of the MOLIT, the Guidelines, etc., specifies the targets of design VE, the review execution time and frequency, the review organization, etc. Finally, the Guidelines for the Operation of the Construction Project Information System (CPIS) provide that the results of the design VE, must be inputted into the Construction Project Information Portal System (CPIPS) to ensure that no data are dropped. [2][3]

Ordering agencies must conduct the design VE as follows. First, the Regional Construction Management Administration and other relevant agencies have no dedicated design VE review department and manpower, and thus, outsource this work mainly under their design supervision, etc. Next, the Korea Land & Housing Corporation (LH) performs more than 100 design VE projects yearly, the largest number of design VE projects undertaken by an agency among those under MOLIT. LH established the construction technology information system (COTIS) in 2014, besides managing the design VE information through the design outsourcing management function of the system. Through its dedicated department, Korea Expressway Corporation (EX) conducts over 10 cases of design VE projects yearly. The existing design VE system was reconstructed in 2013, it now manages the design VE information within the hi-Value portal system. Through its dedicated department, K-Water also performs the design VE work and handles the work through the design VE system within the construction management system. Finally, the Korea Rail Network Authority (KR) has its own design VE team, and its ERP system includes the design VE system. The design VE work procedure is classified into the pre-study phase, the VE study phase, and the post-study phase. The pre-study phase includes the collaboration building stage for ensuring efficient VE work, the common goal establishment stage. The VE study phase, a key stage of VE activities, is designed to use various techniques. Key works include the analysis of functions, deriving of ideas and proposal. The post-study phase aims to formulate action strategies and plans for the derived proposals, and includes the review and approval of proposals. [4]

2.2 Analysis of the Design VE System

The design VE system, after being constructed, operates in the CPIPS, one of MOLIT's work systems. The CPIPS, the total portal of CPIS, is designed to integrate and manage the information and operation environments created by individual CPIS,

for user services and to allow the sharing of construction information. The CPIPS consists of the agency portal system used by the MOLIT HQ, and their subordinate agencies, and the user portal system used by MOLIT's own and subordinate agencies, local governments, contractor, and the public. Under the CPIPS, the agency portal system has 10 major functions, which include Online Integration Manuals, and the user portal system has 10 major functions, which include post-evaluation and design VE, etc. [5]

2.3 Measures for the Improvement of the Design VE System

This study aims to upgrade the design VE system. Towards that end, it presents measures designed to improve the system's functions in line with the amendment of the implementation Guidelines, and to improve the existing statistical function for the design VE input data. The design VE system was initially constructed using the latest IT, including the relevant framework, but it created many problems surrounding the system maintenance and user convenience. To improve and upgrade the system, this study applied the e-government's standard framework, removed the unnecessary Active-X, and adopted the Web standards for boosting the Web access and compatibility.

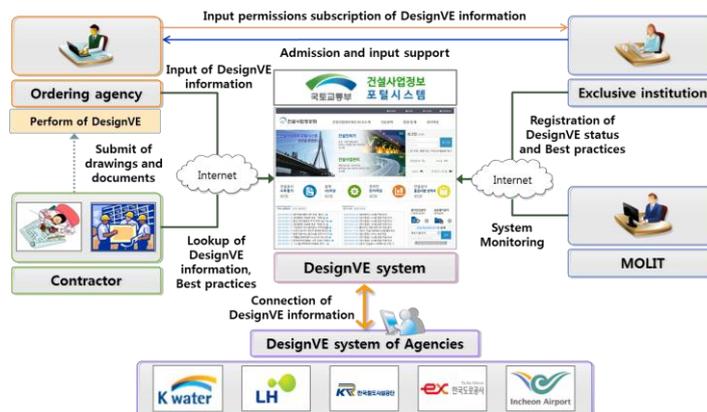


Fig. 1. Concept diagram of design VE system

The improved design VE function again has six major functions, which include the registration and management of the design VE results and statistics, etc. Also, the system users were reclassified into four categories, which include general users, and design VE staff, who were allowed to share among them all the design VE information.

The existing design VE changed its input items in line with the Guidelines, etc., and created the many input items problem. Also, the existing function involved mainly text information, which made it difficult to analyze and use the design VE input data.



Fig. 2. Input status of design VE

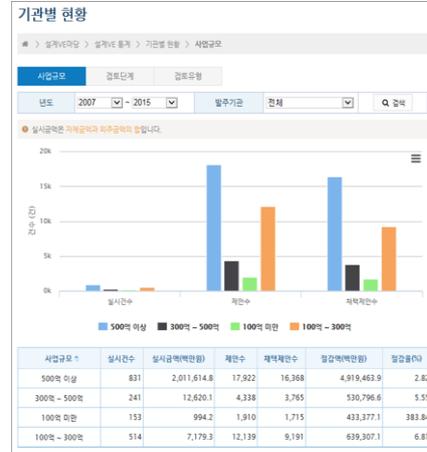


Fig. 3. Statistics by project size

This study addressed these problems and streamlined the input function, pursuant to the guidelines for the amendment of design VE. In particular, the system was improved to establish, as the selective input items, the evaluation statistics, quality model, and other information in connection with the input of the proposed information, and to comprehensively register “the list of ideas and the evaluation outline table” with a huge input quantity in the form of Excel files. In addition, the system was recomposed to boost the analysis and statistical function. Towards that end, the design VE input status and the status data by project size, by review stage, and by review type, among other status data by ordering agency, were expressed in the form of chart-type visualized information. Thus, the design VE performance results by ordering agency can be comprehensively analyzed by project size, by review stage, and by review type. This analyzed information is expected to be used as the basic data for comparatively evaluating the project performance results.

3 Conclusion

The design VE is performed to obtain the best value at the minimum LCC. It analyzes the project's functions to come up with alternative measures. As such, it is a process that involves cooperative work across professional areas; and the function analysis, ideas, and proposal should be used as reference for similar construction. The existing design VE system, however, focused simply on the accumulation of data and the provision of status information. This study reflected the requirements and boosted the visualized statistical function under the amended design VE Guidelines, to present measures for upgrading the system so that it would use the information in the performance of similar construction. These proposed improvement measures are expected to assess the comprehensive analysis of the design VE results, to share the design VE information, to reduce costs, and to improve the quality of construction.

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