

A Study on the Public Construction Project Cost-Saving Practice Information Provision Service Method

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Keywords: CODIL(COnstruction technology Digital LIbrary), CPIPS(Construction Project Information Portal System), Design Value Engineering, Cost-Saving Practices, Public Construction Projects.

Abstract: Cost saving in construction projects consists in building structures with the most economical method while satisfying the user requirements with regard to the features and quality. Cost saving through systematic cost management is required to improve the competitiveness in line with the changing construction environment. Organizations affiliated with the Ministry of Land, Infrastructure, and Transport are striving to save on construction costs by reviewing the economic efficiency of their designs, process management, and project management when implementing public construction projects. They are sharing the design value engineering (VE) results information among the public ordering agencies during the design stage, but the sharing of the cost-saving practices in the construction stage is still insufficient. This study presented step-by-step information systems development and service methods so that people can refer to and utilize cost-saving practices in similar construction projects while carrying out public construction projects. The results of this study are expected to contribute to more rational decision-making in and the higher investment efficiency of public construction projects through the analysis and provision of cost-saving cases information for each stage of the construction project life cycle, such as the planning, design, construction, and maintenance stages.

1 INTRODUCTION

It is difficult to estimate the profit and loss of construction projects compared to the projects in other fields or industries because there is a high degree of uncertainty in the contract execution process. Therefore, the cost of the whole process of a construction project must be managed economically within the specified budget through cost management [1]. Cost saving consists in building structures with the most economical method while satisfying the user requirements with regard to the features and quality. Cost saving through systematic cost management is required to improve the competitiveness in line with the changing construction environment. The Ministry of Land, Infrastructure, and Transport (MOLIT) and their affiliated organizations, such as corporations and industrial complexes, are striving to save on construction costs by reviewing the economic efficiency of designs in the design stage (“Design value engineering” or “Design VE”), as well as the process and project management during the construction stage. At present, the design VE results information is being shared among the public ordering agencies during the design stage, but the

sharing of cost-saving practices in the construction stage is still insufficient.

This study was conducted to build an information system for sharing cost-saving practice information during the performance of public construction projects, and to present an information service method for utilization in the public and private sectors. The results of this study will contribute to the efficient execution of public construction projects through the reference and utilization of related information by the MOLIT-affiliated organizations, local governments, public ordering agencies, and construction companies.

2 STATUS ANALYSIS

2.1 Construction Management System Status

The cost-saving practices of public construction projects refer to success stories that enabled cost savings in construction projects through technical development and project management by MOLIT and

its affiliated organizations, local governments, public ordering agencies, and construction companies [2]. MOLIT requires a review of the design VE during the basic and working design stages for public construction projects with a minimum total project cost of 10 billion won, in accordance with the "Enforcement Guideline for the Review of the Economic Efficiency of Designs, Etc." Furthermore, the results of the design VE are registered and managed through the Design VE Madang in the Construction Project Information Portal System, and the design VE information is shared among the MOLIT-affiliated organizations, local governments, public ordering agencies, and construction-related organizations. The design VE information is limited, however, because it contains only the ideas and improvements in the basic and working design stages as well as summarized information regarding cost-saving practices. The MOLIT-affiliated organizations, such as corporations and industrial complexes, are sharing information by publishing their collections of cost-saving practices in the planning, design, and construction stages. The regional construction and management offices, however, which are affiliated with MOLIT, are not yet publishing or sharing their cost-saving practices.

2.2 Investigation and Analysis of the Current Research Trends

The studies on the cost-saving practices of construction projects have been mostly about the application cases of design VE and the improvement of the construction and engineering methods. Other studies include those on the cost management and saving methods for unit constructions as well as on the construction types, cost-saving methods through schedule management, and analysis of the factors influencing the construction cost.

The analysis of the current research trends revealed that there have been few studies on the cost-saving practice information sharing and service methods for improving the efficiency of public construction projects. Therefore, research on information sharing and service is required for the integrated and systematic management and utilization of cost-saving practices in the execution of public construction projects in the future.

2.3 Analysis of Cases of FMMS-based Bridge Inspection and Analysis

FMMS's inspection and diagnosis menu consists of planning in line with the above workflow,

management of the inspection history, inquiry about the damage photos by member and about the maps of damages by visual inspection, internal approval, and confirmation of the inspection book. Fig. 1 shows cases of the history of inspection and diagnosis.

3 INFORMATION SYSTEM DEVELOPMENT AND SERVICE METHODS

In this study, to develop a cost-saving practice information system for construction projects, the design changes, design standards, and operation process revisions were analyzed based on the "Collection of Expressway Design Work Practices" published by Korea Expressway Corporation. Furthermore, a database (DB) of cost-saving practices and original data such as project outlines, status, problems, improvements, and conclusions with regard to construction cost-saving practices was constructed through the preparation of metadata [2].

The construction project cost-saving practice DB was designed to consist of four major types of information: "cost-saving practices", "cost-saving practice application details", "cost-saving practice utilization plans", and "cost-saving practice common codes". The cost-saving practice information includes the general status information of construction projects, including the project outlines. The cost-saving practice application details consist in the processing status and the results of requests for cost-saving practices in public ordering agencies and construction companies. The cost-saving practice utilization plans allow the entry of a detailed utilization plan to view or download cost-saving practice information or attached files. The cost-saving practice common codes define classification names, classification types, and codes according to the integrated construction information classification system to improve the search and view convenience.

In this study, a step-by-step information system development method was prepared for the utilization and integrated management of cost-saving practice information in the future by MOLIT and the regional construction and management offices.

First, the construction project cost-saving practice information system was set up in such a way that it can be serviced from CODIL (Construction Technology Digital Library), which corresponds to a unit system of the Construction Project Information System, one of MOLIT's operation systems. CODIL is easily accessible by the MOLIT-affiliated

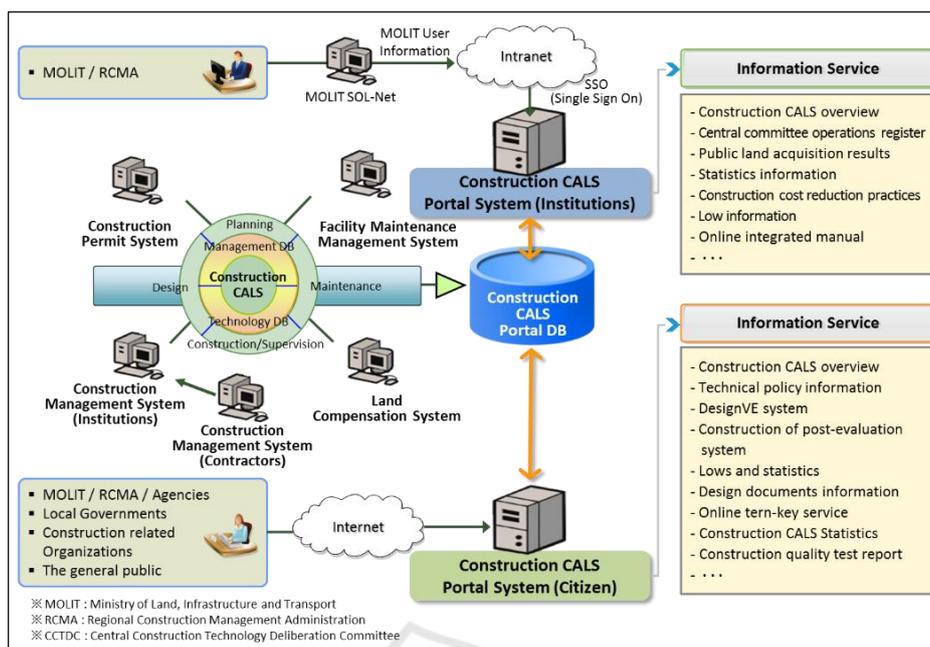


Figure 1: Concept diagram of the CIPIS (Construction Project Information Portal System).

organizations, local governments, public ordering agencies, and construction companies because it is located on the Internet. When MOLIT and the regional construction and management offices, however, which are on the organization network (internal network), want to view cost-saving practices, they must change from the organization network to the Internet before logging on to CODIL, which is inconvenient.

To address this problem, an upgrade plan was first established for the development of the cost-saving practices view feature on the Construction Project Information Portal System (for agencies/public) and for service provision in connection with CODIL, and for later enabling integrated management through the development of management features for cost-saving practices in the future.

The construction project information portal system is a gateway to the construction project information system. It works as a single-access window and performs public services by integrating the information from each construction project information unit system and their operating environments. The system enables the sharing of diverse construction information. The figure below is a concept diagram of the said system. The construction project information portal system consists of the agency portal system, which is used by the MOLIT headquarters and subagencies, such as five regional construction and management administrations, and the public portal system, which

is used by the MOLIT subagencies, other departments, municipalities, construction companies, and the general public. The agency portal system has 10 major functions, including the operation of the central committee, and the public portal system has 10 major functions, including the post-evaluation of construction projects, design VE square, online turnkey square, design drawing information square, and cost reduction cases of construction projects. For the development of the view feature for construction project cost-saving practices, a DB of cost-saving practices will be developed and managed in CODIL before developing OpenAPI. Next, for the public portal system, a metadata collection feature for cost-saving practices will be developed for linking with CODIL. Lastly, information linking with the public portal system will be developed so that the MOLIT users can access the agency portal system to search and view cost-saving practices [3]. The following figure shows a conceptual diagram for the development of a cost-saving practices view feature [4].

Next, the development of cost-saving practice management features is identical to the development of the cost-saving practices view feature, but first, a public portal system-CODIL cost-saving practices synchronization process must be developed. Next, the cost-saving practices search, view, entry, and modification features through the agency portal system will be developed for the MOLIT users.

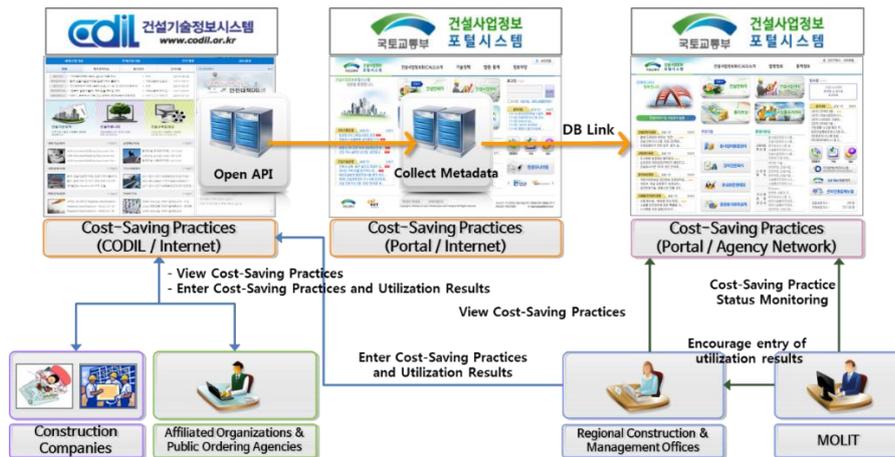


Figure 2: Development of a view feature for construction project cost-saving practices.

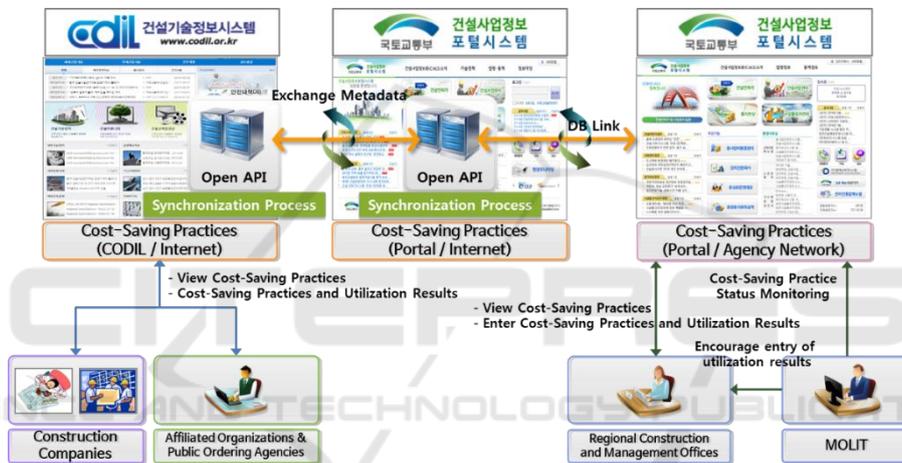


Figure 3: Development of construction project cost-saving practice management features.

Furthermore, the downloading feature for the attached files regarding cost-saving practices will be developed in such a way that the downloading of such files will be allowed only after a utilization plan is entered [3]. The following figure shows a conceptual diagram of the development plan for the cost-saving practice management features.

A cost-saving practice icon was added to the initial screen of the Construction Project Information Portal System for agencies so that it can be used to view the same information as the cost-saving practices entered in CODIL [4].

The initial screen of the agency portal system was developed in such a way that selecting the construction project cost-saving practice icon on the initial screen will show the list of cost-saving practices, and selecting an item in this list will allow the user to download the details of and the attached files regarding the selected cost-saving practice [4].

The MOLIT-affiliated organizations, local governments, public ordering agencies, and construction-related organizations such as associations should maintain a cooperation system for the continuous expansion of the cost-saving practice DB for public construction projects in the future. Furthermore, the services must be increased and the features must be upgraded so that construction sites and workers can frequently refer to the cost-saving practice DB [2]. In particular, such issues as double management of data and synchronization between CODIL and the Construction Project Information Portal System could arise due to the development of the construction project cost-saving practice management features. Therefore, the integrated information service of the construction project cost-saving practices requires the preparation of system upgrade plans considering the efficient management of the computing resources.



Figure 4: Initial screen of the construction project cost-saving practice portal system for agencies.



Figure 5: Detailed screen of the construction project cost-saving practice portal system for agencies.

4 CONCLUSIONS

This study aimed to improve the efficiency of construction project execution through the sharing and propagation of cost-saving practice information among public ordering agencies, such as the organizations affiliated with the Ministry of Land, Infrastructure, and Transport (MOLIT), by building a database (DB) and providing information services based on the cost-saving practices of the affiliated organizations, such as Korea Expressway Corporation, for public construction projects. For this purpose, step-by-step information development and cost-saving practice information service methods were presented so that cost-saving practices can be

referred to and utilized for similar public construction projects.

The analysis and provision service of cost-saving practice information by life cycle stage of public construction projects, such as the planning, design, construction, and management stages, are expected to contribute to more rational decision-making in, and the higher investment efficiency of, public construction projects in the future.

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