

THE INTEGRATED MANAGEMENT SYSTEM(FIMS) FOR THE FOUR MAJOR RIVERS RESTORATION PROJECT IN SOUTH KOREA

Oh Kyoung Kwon, Sanghyuk Park, Young Joon Jun¹, Min Jae Suh, Do Hyong Shin

Construction Strategy Research Institute, HanmiParsons Co., Ltd.
9th Fl., City Air Tower Bldg., Samsung-dong, Kangnam-gu, Seoul, Korea
yjjun@hanmiparsons.com

ABSTRACT

The objectives of the Four Major Rivers Restoration project are to make a comprehensive management system for river restoration in South Korea, and to boost domestic economy and employment. There are four main issues which should be addressed to successfully complete the project. First, effective communication should be made between the numerous and various participants involved in the huge project. Second, an integrated management system for the project is required to overcome the manpower shortage of the project owners. Third, even though the project is huge in its scale, it has to be completed approximately in two years. Fourth, the project cost should be effectively managed because the budget for the project is very tight especially in the recent global financial crisis. To address these issues, this study developed the integrated management system for the project, which is called the FIMS(Four major rivers integrated project management system). The FIMS consists of integrated management module, project owner module, and contractor module. Each module provides project information such as schedule, cost, and completion status, which integrates the management of the project. With the FIMS, various owners and contractors of the project will be able to manage the huge project more efficiently, which is critical to the successful completion of the project in the planned schedule and budget.

INTRODUCTION

Many countries around the world have tried major river projects for further development of their cities, such as Tennessee Valley Development Project (TVA) in U.S. and Damodar Valley Development Project (DVA) in India. It served as a foundation of economic revival and provided a better quality of life. In South Korea, the construction project which is called 'the Four Major Rivers Restoration Project' was planned from 2009, to help the recovery of the domestic economy from the international financial crisis, to minimize flood and drought damage, to build recreation spaces in accordance with a rise in national income, to set up an integrated management system about local independent irrigation projects and river improvement, etc. However, the major public projects carry various factors of discouragements, such as injecting large budget, a short project period, and complicated decision making process and so on. Therefore, it is necessary to set up a systematic project management method and apply it to reduce the risk of the major public projects.

This research tries to predict the risks of the major public projects, establish a systematic management system base on the predictable risks, and create an Integrated Management System (FIMS) that takes each management areas from a program management point of view.

THE RISKS OF FOUR MAJOR RIVERS RESTORATION PROJECT

As mentioned above, the goal of 'the Four Major Rivers Restoration Project' is to enhance Korea's growth competitiveness through major public developing projects.

Several government bodies are involved and place orders to around 100 general contractors on the project which is worth about 24.3billion USD(KICT, 2009).

As this project covers the nation's overall land area, thus need a macroscopic project management system, we analysed and found some risk factors which are as follows:

Tab. 1: Summary of The Four Major Rivers Restoration Project

Business Sector	Governments	Business Content	Budget (billion USD)
Direct Pjt.	Ministry of Land, Transport and Maritime Affair	Projects for Water Restoration and Flood Management	16.9
Direct Connection Pjt.	Ministry for Food, Agriculture, Forestry and Fisheries Ministry of Environment	Reconstruction for the river and stream Construction of the Sewage disposal facility	5.3
Connection Pjt.	Each government ministry, local autonomous entity	Development of Waterfront	Additional Program

The need of communication due to organizational complexity

In this project, several kinds of organizations are participating. Some participate as main ownership organizations, including Regional Construction and Management Administration, Each Regional Environment Administration, Local Autonomous Entities, Korea Water Resources Corporation, Korea Rural Community Corporation (HanmiParsons, 2009). Others participate in it as temporary PM including Office of National River Restoration, Ministry of Land, Transport and Maritime Affair and 6 more organizations.

Moreover, it is necessary to build a communication management plan in order to achieve an effective management operation, as various private sectors, engineering & design companies, general contractors, sub contractors, consultants, are also involved in this project.

The lack of managers

The planning and the designing process of the project are reviewed for a relatively short period of time due to the urgency of the political and economic situation of South Korea. Accordingly, standardization for codes, specifications, detailed construction material statements and standard drawings with the consideration of environment, top water, industrial water, logistics should be realized. Construction material supply chain management and emergency measures should also be strengthened.

However, Office of National River Restoration, which supervises the overall project, are consisted of 69 workers, who are temporarily dispatched from different government departments. Additionally, the main organization, Regional Construction and Management Administrations, has only 58 workers for the project, so they do not have any capacity to manage and control the overall project as a control tower due to heavy administrative duties.

As a result, a total management system must be introduced to the project based on a program management point for decreasing their heavy duties.

The need of absolute construction operation

The project has a very high possibility about change orders with a fast track method because the entire construction project excluding dams, reservoirs and detentions should be completed within 2.5 years. And it is very difficult to supply construction equipments, workforces and construction materials, as it is a temporary and a short term project. There is also a high possibility of civil complaints and construction operation delay due to environment pollution, safety accidents, flood and so on. Moreover, the rigidity of Korean construction business makes insufficient operation management capacity to general contractors.

In order to improve the situation, a systematic schedule management should be adopted to the project.

The need of systematic cost management system

Most of the construction project will be completed by 2011. The entire project including dams and reservoir constructions will be finished by 2012. Accordingly, the project has a very short period of time and a limited budget, so it is necessary to create a time shortening method before the operations are

started. It is also required to adopt a systematic cost management method to prevent from going over the budget, secure transparency and fairness.

Especially, design management system and cost management system linked to design management system are assisted to expand the application of new technologies, new methods and new construction materials to reduce the construction cost and operation duration.

Furthermore, it is also required to strengthen the program management as a control tower for design & construction management method confirmation under different project delivery methods, design standardization, advancement, and high technology.

Other risks and uncertainties of the project

As for the nature of the project, which breaks ground across the whole nation at the same time, it is highly likely the project could entail environment and safety issues. Thus, the project has to prepare such uncertainties by implementing the risk management system against the protest from NGOs and environmental movement organizations.

FOUR MAJOR RIVER INTEGRATED MANAGEMENT SYSTEM(FIMS)

A program management, a subordinate concept to a project management, is a comprehensive idea that realizes centralized and modified management to achieve the strategic and profit goal, in line with several other lower ranked projects. (CMAA, 2010). Therefore, a program management, not project management, must be applied to the project, as around 400 construction field units are involved in this large scaled national project. Above all, this research created a program management area and fundamental work scope for the management system organization of the Four Major River, through benchmarking Multifunctional Administrative City construction project, Incheon International Airport construction project, MND-USFK Base relocations in Korea, Hong Kong New Airport construction project in China and Crossrail project in England (London).

Tab. 2: Program Management Area & Fundamental Work Scope

Program management area	<ul style="list-style-type: none"> ◆ General Management ◆ Cost Management ◆ Communication Management & Public Relations ◆ Risk Management 	<ul style="list-style-type: none"> ◆ Design Management ◆ Schedule Management ◆ Contract & Claim Management ◆ Quality & Safety Management
Fundamental Work Scope	Program Management Action Plan	<ul style="list-style-type: none"> ◆ The scope and the regulation for each management section process manual ◆ Management target and regulation standard for each developing agency
	Program Management Process Manual	<ul style="list-style-type: none"> ◆ Role & Responsibility Proposal for each developing agency ◆ Project work process standardization
	Development of FIMS	<ul style="list-style-type: none"> ◆ Integrated management web solution system of the process manual ◆ Total information processing system of information organization
	Other Duty	<ul style="list-style-type: none"> ◆ Training for each regional and developing agency ◆ System Operation & Maintenance

Under such conditions, this research created an integrated project management system(Figure 1) which is distinguished by management levels, in an effort to establish and introduce efficient project management system to Office of national River Restoration, developing agencies and each contractor level.

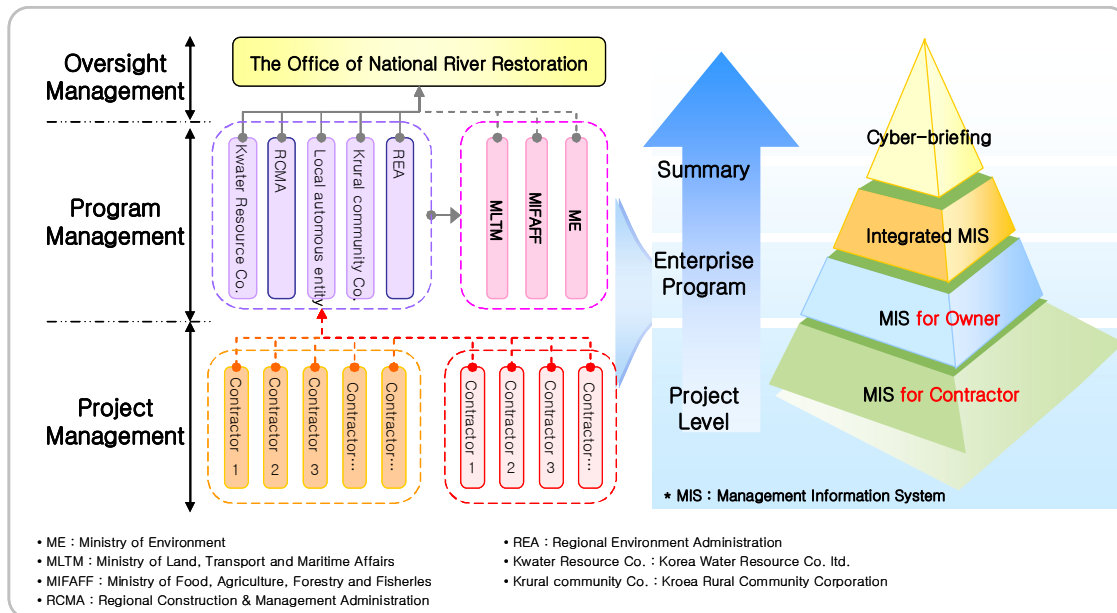


Fig. 1: Project Management System for each developing agency (3-level)

Classification Setup

The project classification is schematized, organized and defined by an identification number of project unit process, construction type and construction area. The integrated project management system is established based on work breakdown structure (WBS), project numbering system (PNS), cost breakdown structure (CBS) and organizational breakdown structure (OBS).

Process Manual Setup for Integrated Project Management

As mentioned earlier, the project has a very complicated hierarchical project organization. So, this research developed a document, 4 process manuals and a guidebook, to establish a standard guideline and criteria for a consistent and systematic working performance as a result to provide project participants uniformity and consistency. It is a fundamental requisite at the early stage of the project, so Integrated Management Information System and Performance Manuals are developed to be useful to the project after considering project management standard performance manuals and construction supervision performance manuals which are previously introduced by the Korean government (HanmiParsons, 2010).

- Document : Integrated Project Management Process Document
- Procedure : Construction Schedule, Construction Cost, Project Information Management, Project Numbering System Procedure
- Guideline : User Manual for FIMS

Project Schedule Management System Setup

In a project schedule management system, there are 3 levels (Integrated management module, Project owner module and Contractor module) according to the operation target. And Critical Path Method (CPM) is adjusted for personnel in charge to understand at a glance about all construction sites, to check a current status and to recognize schedule delay factors beforehand.

Project Cost Management System Setup

Project cost management system has to be established for a systematic and scientific management, to include the allocation of total project cost and an annual budget, contract-payment management, budget record management, project cost variation analysis and adjustment for each construction site because a huge budget from various owners is flown in the project. Therefore, management system has to be set up to achieve the project goal within the budget.

The Integrated Management System(FIMS) Setup

It is essential to establish an integrated management information system for systematic and efficient decision making and project management to each project participant.

Accordingly, the Integrated Management System is developed to make communication smoothly among the project participants and accompany rapid decision making through unification and centralization of information system to accomplish the goal successfully.

- Development of multi-level organization structure with oversight management concept for all participants in Four Major River Restoration
- Forming PMIS (Project Management Information System) for the each individual participant to build a relationship among project participants (owner, CMr, supervisor, designer, general contractor).
- Grouping PMISs to realize the program management for Office of national River Restoration with analysing each participant’s schedule and cost management, operating a project numbering system and a current status management.

Table 3 and Figure 2 below show the FIMS functions and system simulation example.

Tab. 3: Main Functions of FIMS

Cyber Headquarter	<ul style="list-style-type: none"> - Analyzing real time information from the Supervision Management System through a classification system, and presenting project current status through a dashboard(Figure 2-①) - Providing visual technologies about overall project process status, and checking a risk intuitively in accordance to the construction progress and project cost status from each project developing agent and project location - Providing a project progress and schedule, a project cost, a project scheme, a 2D simulation - Providing a web cam service from each project location - Providing 4D CAD for the each participants
Supervision Management System	<ul style="list-style-type: none"> - Automatically combining current status information from overall schedule information and planning information from the contractor input data - Analyzing a project current status about schedule, progress, project cost from each project developing agency and classification(Figure 2-②)
Project Management System for Developing Agency	<ul style="list-style-type: none"> - Automatically combining current status information about planning information and project developing agency input data - Analyzing a project current status about schedule, progress, project cost from each contractor and classification(Figure 2-②)
Contractor Management System	<ul style="list-style-type: none"> - Managing a system for actual data from each project participants(Figure 2-③) - Reporting a process progress, a schedule, and a project cost performance

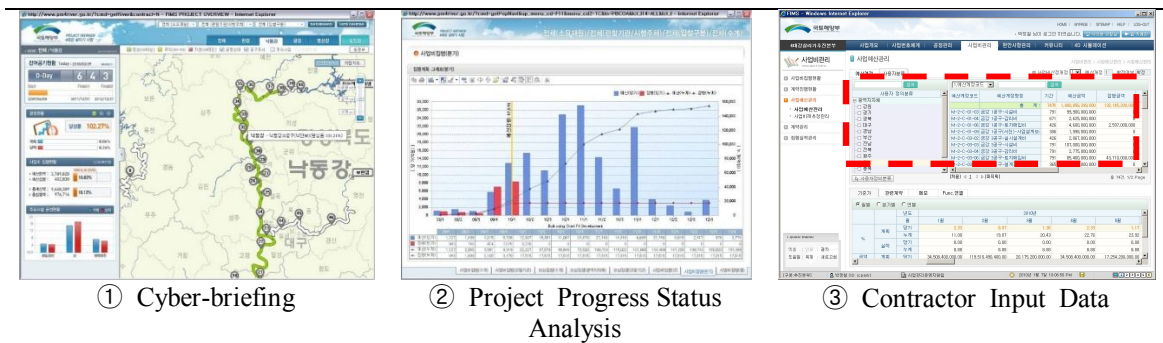


Fig. 2: FIMS simulation samples

CONCLUSION

The mass infrastructure developing project is not a single unique project, but a multi-dimensional one and thus has a very complicated structure. For this reason, there are so many variations on each phase from Plan-Design (Engineering)-Construction-Maintenance. In other words, how active the project copes with the variations of the project is the most important factor to decide whether it was successful or not.

Therefore, an organic collaboration among organizations, strengthened role and responsibility, accurate information support system and rapid decision making will be a significant factor for the future Program Management Project.

As a result, the program management of the Four Major Rivers Restoration Project is expected to be the best practice for the future mega construction management system establishment.

ACKNOWLEDGEMENT

This research was supported by a grant(06 CIT A03) from Construction Infra Technology Program, also 4 Major Rivers Restoration Technical Support Service Phase 1 & 2 as funded by the Ministry of Land, Transport and Maritime Affairs of the Korean Government.

REFERENCES

- CMAA (2010), *Construction Management Standards of Practice*, CMAA.
HanmiParsons(2009), *Project Implementation Plan to 4 Major Rivers Restoration Technical Support Service*, HanmiParsons Co., Ltd.
HanmiParsons(2010), *Integrated Project Management Process Document for 4 Major Rivers Restoration*, Ministry of Land, Transport and Maritime Affairs.
KICT (2009), *Master Plan for 4 Major Rivers Restoration*, Office of national River Restoration.

BRIEF BIOGRAPHY OF PRESENTER

2009 ~ Present

Researcher, Construction Strategy Research Institute, HanmiParsons Co. Ltd.

2007 ~ Present

Ph.D. Candidate, Dept. of Civil Engineering(Construction Management, Major)
Hanyang University, South Korea

2005 ~ 2007

M.S., Dept. of Civil Engineering(Construction Management, Major)
Hanyang University, South Korea

2000~2005

B.S., Dept. of Civil & Environment Engineering
Hanyang University, South Korea

Field of Interest

Construction Management / Project Management
Private Finance Initiative
Construction Policy