

A New Approach for Contracts Between Leading-partner and Sub-partner in Overseas Nuclear Power Projects: Applying the Target Cost Method to Team Korea

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1. Introduction

The Lump Sum method, commonly used in EPC contracts for large-scale projects, is the most prevalent contract type due to its fixed pricing structure. However, it shifts significant risk onto the contractor, particularly during project execution when adjusting the contract amount is challenging. This study proposes addressing the limitations of contracts between consortium contractors, such as those within NPP Team Korea, by applying the Target Cost method. Unlike the traditional focus on the relationship between the client and the contractor, this research targets the internal agreements between the leading partner and sub-partners within the consortium. The objective of this study is to analyze the advantages and disadvantages of the Target Cost method and review cases where performance-based incentives contributed to successful collaboration among consortium partners. Additionally, it compares the traditional contract structures with the Target Cost method specifically within the consortium context. Surveys and interviews with experienced professionals in international EPC projects and academic experts specializing in Target Cost will be conducted. The goal is to help contractors enhance collaboration and share risks more effectively, thereby improving project success rates within the consortium framework.

2. Literature Review

2.1 Study on Incentive effectiveness

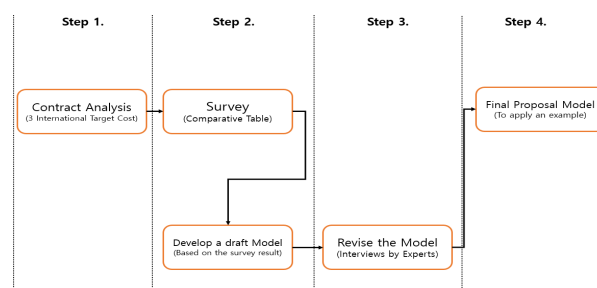
Research by Paladugu (2015) found that projects with performance-based incentives showed better cost and schedule outcomes compared to those without incentives, with cost increases averaging 0.97% and schedule increases averaging -0.98%, compared to 6.5% and 3.7% for projects without incentives, respectively. However, research on effectively integrating these incentive structures into consortium contracts between leading and sub-partners within EPC projects is limited. Moreover, there is a lack of studies on the application of Target Cost methods specifically within internal consortium agreements rather than between the owner and contractors.

2.2 Previous Research Related to Target Cost and EPC Contracts

Previous studies have laid a strong foundation by highlighting the benefits of incentive mechanisms in improving project performance. For example, research by Álvarez-Pozo et al. (2024) emphasized the necessity for more adaptive and responsive contract models to enhance project delivery efficiency and financial performance. However, unresolved issues remain, particularly regarding the application of Target Cost methods among consortium contractors within their internal contractual relationships.

3. Methods and Results

This study implements a structured research methodology to develop a new model based on the Target Cost method for contracts between leading and sub-partners within NPP Team Korea executing EPC contracts. The methodology follows a step-by-step process as outlined in the flowchart below:



3.1 Comparison Between Traditional and Target Cost Contract

A comparative review was conducted between traditional contracts used by NPP Team Korea in overseas nuclear power exports and general Target Cost contract methods. This analysis identified differences in 13 key areas specifically relevant to internal consortium agreements.

3.2 Comparison of International Target Cost Standards

The 12 key clauses and descriptions regarding the Target Cost Method from three international standard construction contracts—the American Institute of Architects Integrated Project Delivery (AIA IPD), New

Engineering Contract 4 (NEC4), and Design-Build Institute of America Progressive Design-Build (DBIA PBD)—were compared and organized into Table 1. Based on this comparison, 37 questions were formulated through discussions with experts. These questions were then used to conduct a survey involving approximately 25 experts from academia and industry. The results of this survey served as the foundation for

developing a new Target Cost-based contract model applicable to the internal consortium agreements of NPP Team Korea. academia and industry. The results of this survey served as the foundation for developing a new Target Cost-based contract model applicable to the Prime Contractor and Subcontractors of NPP Team Korea.

Table 1. Comparison Table of International Standard Documents Related to Target Cost

Category	AIA IPD (Integrated Project Delivery)	NEC4 Target Cost Contract	DBIA PDB (Progressive Design-Build)
Structure			
Contract Method	Target cost	Target cost	Target cost / GMP
Overall Process	Collaborative, early involvement, open information	Structured stages, collaboration, risk management	Qualifications-based, collaborative, define risks, finalize terms
Team Composition	Early, collaborative, key stakeholders	Traditional procurement, key stakeholders	Collaborative from inception to completion, key stakeholders
Organization	Beyond owner-architect-contractor, primary and key supports	Traditional hierarchy, defined roles	Team chosen for qualifications, collaborative alignment
Motivation	Shared goals, collective performance, financial rewards	Incentives for improved performance, early warnings	Performance-based incentives, risk management, reliability
Cost			
Cost Determination	Prime metric, lifecycle emphasis, open book estimating	Contractor advises and forecasts costs, submits pricing info	Price commitment after scope/schedule agreement
Profit Sharing	Gain share for success, tied to project goals	Assessed share of savings, final assessment after completion	Incentives for superior performance
Risk Sharing	Collectively managed, primary costs by owner, minor by team	Assessed share of cost differences, contractor pays excess	N/A
Cost Adjustment	Immediate feedback, detailed estimates, rational decisions	Discuss and agree on budget changes within four weeks	Negotiate terms, amend/second contract as needed
Contingencies	No hidden contingencies, general project contingency	Change Scope for defects/compliance, early warning for cost/delays	Real-time estimates, formal proposal including contingency
Others			
Dispute Resolution	No dispute mechanisms, internal resolution, no suit clause	Traditional dispute process, Dispute Avoidance Board	N/A
Confidential Info	Confidentiality agreements	N/A	Managed through confidential meetings during procurement

3.3 Development of a New Model Through In-Depth Interviews

Based on the survey results, a new model applicable to consortium contractors was developed using the comparative scores of the Target Cost standard contracts and the importance of 12 key clauses as metrics. This draft model was then refined through in-depth interviews with five Target Cost experts.

3.4 Verification Through Application of the New Model to the FIDIC Silver Book

The new Target Cost-based model, incorporating 12 key clauses, was applied to the FIDIC EPC/Turnkey Silver Book, the most widely used in global EPC contracts. Although this application was not directly on an actual consortium contract, it enhanced the practical applicability of the model for large EPC projects like those undertaken by NPP Team Korea. Specifically, it developed an effective contractual approach within the consortium, focusing on the relationship between the leading partner and sub-partners, rather than just between the owner and contractor, to ensure project success.

4. Conclusions

This study proposes a Target Cost-based model to address the challenges faced by NPP Team Korea in executing contracts between consortium partners in overseas nuclear power projects. Through a comparative analysis, key differences between traditional and Target Cost contracts were identified,

forming the basis for a new contract model tailored for consortium contractors. By engaging with experts and refining the model through in-depth interviews, a practical and effective approach was developed. The model was further validated by applying it to the FIDIC EPC/Turnkey Silver Book, demonstrating its potential to enhance collaboration and flexibility within consortium agreements. In summary, the proposed Target Cost-based model offers a viable alternative to traditional contracts, aiming to improve the success of NPP Team Korea's future EPC projects through better risk-sharing and collaboration within consortium partnerships.

ACKNOWLEDGEMENT :

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