Implementation Strategies for Whole-Process Cost Consulting in Construction Projects

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Keywords: Construction Project; Whole-Process Cost Consulting; Implementation Strategy

Abstract: This paper focuses on the implementation strategies for whole-process cost consulting in construction projects. It first proposes establishing a professional organizational structure and team collaboration mechanism, covering the clarification of role positioning and strengthening cross-departmental collaboration. Subsequently, it elaborates on the application of advanced technological tools and digital management methods, including the promotion of BIM technology and the construction of big data analysis and intelligent decision-making systems. Then, it emphasizes optimizing the whole-process control system, proposing control points for key stages such as design, bidding, construction, and completion. Finally, it underscores the importance of perfecting the risk prevention and control system and emergency plans, involving the identification of risk points and the formulation of response strategies. The aim is to provide comprehensive and effective implementation guidance for whole-process cost consulting in construction projects.

1. Introduction

Track throughout the construction processFull-process cost consulting in stage of project designing, bidding, construction, and final account (settlement). Its goal is to control project investment in a scientific manner and allocate resources as effectively as possible. At the core of this is dynamic, risk prevention and control and value creation. This necessitates the coordination of multi-dimensional strategies encompassing technology, economy and management so that the project is finished on time with good quality and within budget. Next sections elaborates whole-process cost consulting implementation strategies from four aspects: organizational structure, technological tools, process control, risk prevention and control in a systematic way.

2. Building a Professional Organizational Structure and Team Collaboration Mechanism

2.1 Clarifying Role Positioning and Responsibility Division

The whole-process cost consulting work is complex, with many links involved. Establishing a matrix structure of "Project Manager + Professional Groups" is the key to advancing the project in an efficient manner. Overall coordination is a big responsibility that the project manager, as a core hub of the whole process, takes on. They need to keep in close touch with the owner and really understand what their needs and goals are for the project while also managing relationships among all parties like design and construction, ensuring that all phases of a project connect seamlessly and run smoothly. Official groups divided by project stages, such as decision-making group, design group, construction group. Whatever there are several groups of employment, each can be divided into an economic analysis, contract management and cost control process related to a work system with rights and responsibilities taken on as well as complete coverage. The preparation of feasibility study report is the key point for leading within early project to prepare economically logical and technically feasible analysis, decisions and strict review on investment to give a reliable basis as reference feature in basic work. The design group is involved in the design process, using professional knowledge to make comparative economic comparisons of different design schemes and giving optimization suggestions from the perspective of cost control to ensure that the design scheme should achieve optimal cost according to functional requirements. The construction group

  DOI: 10.25236/icacel.2025.011

crafts a relevant portion of the construction period, an analysis to real-time dynamic costs on all spending [1], recorded with detailed precision and systematic execution for each individual expense, closely monitoring change events, balancing effort against benefit before allowing changes to occur in order to control change management and make project costing maintainable.

2.2 Strengthening Cross-Departmental Collaboration and Information Sharing

Regular communication mechanisms must be established to make the overall project efficient. All parties report on work progress, current problems and potential solutions during routine meetings so information flows quickly and is shared effectively. Thematic seminars are organized where key issues and technical challenges around the project are discussed for synerge jointly to search for solutions. The initial design phase focuses on getting cost personnel early in the process. They have a deep understanding of cost data and rich experience, so they can analyze design programs from an economic perspective in the design stage and put forward practical optimization suggestions to avoid serious overspending. In the construction phase, real time interface between cost consulting team and engineering department around progress payments, change visaas etc. Timely, accurate communication promotes reasonable progress payments that are compliant and can avoid errors or delays caused by an information lag. The double review mechanism of authenticity and rationality for change visas by both parties can effectively prevent false changes and unreasonable costs, so as to control the expenses. The use of information platforms such as BIM collaborative management platforms help to share data and update it in real-time [2]. Project information can be accessed by personnel of all parties at any time and from any place, which breaks through the information "island", improves the collaborative work efficiency, and provides strong support for the smooth progress of the project.

3. Applying Advanced Technological Tools and Digital Management Means

3.1 Promoting BIM Technology for Whole Life-Cycle Management

As a product of the contemporary digital era, BIM (Building Information Modeling) technology is also a modern revolutionary technology in the construction field. It deeply integrates geometric shape, physical attributes and functional information of building projects into comprehensive multi-dimensional visual tools to provide support for cost consulting work. In the preliminary project planning and design phases, quantities can be extracted precisely and automatically from BIM models. This not only greatly reduces human errors compared with traditional manual calculation methods, but also greatly improves calculation efficiency, so that cost personnel can put more energy into cost analysis and optimization work. The construction phase is when the real benefits of BIM technology come. From the construction progress and resource consumption simulation, which will analyze potential conflicts or problems during the process of construction, such as pipeline clash or unreasonable contest phase [3]. Based on this construction organization design can be optimized accordingly, construction sequences and resource allocation are reasonable arrangement to avoid rework in the course of construction, to maximize the resource utilization efficiency, which insuring the smooth progress of engineering. In project O&M, the BIM model can be associated with in-depth equipment information, maintenance records, and other data. The O&M personnel can quickly find the needed equipment, acquire information on its operating state and maintenance record through the model, arrange for future maintenance schedules ahead of time to handle possible breakdowns immediately, prolong service life of equipment and minimize O&M costs throughout the whole project life cycle.

3.2 Constructing Big Data Analysis and Intelligent Decision-Making Systems

The foundation for conducting big data analysis is establishing a comprehensive and detailed project cost database. The database calls upon tremendous datasets such as historical project data, prices from the real-time market and industry benchmarks. However, with sophisticated machine-learning models, the cost can be predicted accurately. Since regression analysis algorithms

can be used to systematically describe the association between unit price of concrete and all features that will affect it, as well as the future trend prediction of fluctuation of them, this gives a natural explanation for structural analysis decisions when project material should be procured. There are cluster analysis methods that classify and assess the risk of contract terms in a very meticulous manner, quickly identifying high-risk contract terms from the mass of contracts and formulating corresponding response strategies in advance to avoid potential risks related to contracts. Moreover, intelligent auditing tools should also be created to evaluate bill item characteristics against pricing standards using machine learning algorithms [4]. Fast and accurate identification of errors and non-standard practices in bill preparation can greatly enhance audit efficiency and accuracy, effectively eliminating the subjectivity and omissions of manual audits, ensuring that cost consulting work is both high quality and reliable.

4. Optimizing the Whole-Process Control System and Key Node Control

4.1 Design Stage

Project cost is determined decisively already in the design stage. The implementation of Limited Cost Design with the limiting value set based on the investment estimate can limit design indicators for other disciplines. Such as quantifying building area out of the cost, steel net content in the structure, refining costs by discipline and link control targets. In the design process, designers have to strictly implement cost limit indicators and project functions and quality requirements in order not to exceed the budget estimate. Value Engineering (VE) analysis methods identify opportunities for improving value via systematic function-side and cost-side engineering of project metrics. Performing essential functions at a lower cost or by increasing cost significantly improving function, obtaining the best relationship between function and the model of at an optimal price. The design scheme is optimized through Value Engineering analysis, and project cost as well as project cost-effectiveness is improved under the premise of ensuring quality [5].

4.2 Bidding Stage

Tender documents preparation is the core link in the bidding stage. Key contents include clarifying the basis for pricing, risk allocation and price adjustment mechanisms. For instance, material price fluctuation risk: reasonably stipulate relevant adjustment rules, such as "when the price fluctuation of steel exceeds ±5%, the excess part shall be adjusted according to the actual steel price" to avoid disputes arising from price fluctuations. Create a bid clarification system and bring together professionals to do a in-depth review of bid documents. To focus on the review of whether the technical solution is feasible and quotation is reasonable, eliminating unbalanced bids or low-cost bids, ensure the fairness of bidding and ensuring smooth project implementation. Following contract signing, carry out briefings on critical clauses without delay. Clarify the important contents such as payment methods and change procedures in detail to all parties involved in the project, that will ensure all parties share the same understanding of contract terms, help avoid conflicts and disputes of execution due to misunderstandings about these clauses,and on the other hand protect the smooth progress of projects.

4.3 Construction Stage

Construction often comes with many changes in cost so you need to have a more dynamic table that tracks costs. You need to compare actual costs with the budget variance, month by month, and thirdly use several data analysis techniques to analyze the deeply-rooted reasons of variances such as increasing material prices, bigger quantities or poor construction efficiency. Develop targeted corrective action plans based on the reasons, adjust cost plans in time and keep costs under control.

You need a strict control when it comes to change events. Re-reviewing the changes to eliminate unnecessary change costs; issue changes with meticulous calculation of change costs, ensuring that the numbers are accurate, valid and reasonable; gradually standardize the approval process of change and strictly comply with regulations. Carry out the design while constructing while

changing behavior, thoroughly clean up the chaos of change management, prevent loss control of cost caused by chaotic change management, and ensure that the project is completed successfully within budget.

4.4 Completion Stage

At completion, settlement auditing serves as the line of last defense against runaway costs. For settlement purposes, check contract scope to ensure the claims content is consistent with contract agreement; conduct strict reviews of change visas and claim justifications to effectively avoid billing for duplicate or falsely reported quantities. Establish the precondition of correctly calculating the final engineering cost by strict settlement auditing to protect the legitimate rights and interests between both sides of construction unit and contractor. It is a necessity to examine the project after it has been completed. Wrap up lessons learned during the cost management process and evaluate best practices as well as identify existing problems. Many of these lessons learnt can become vital intellectual property and serve as a guide for future projects, constantly refining the cost management system and directly enhancing the enterprise's ability in cost management as well markets competitiveness [6].

5. Perfecting the Risk Prevention and Control System and Emergency Plans

5.1 Identifying Whole Life-Cycle Risk Points

The project risk list needs to be sort out and selected through a comprehensive in-depth analysis of key dimensions such as policies and regulations, market fluctuations, technical changes, contract disputes throughout the project life cycle. The policies and regulations level, the environmental requirements continue to be more stringent, if a project in the construction stage of continuous policy changes but not keep up, it will also face the risk of work stoppage for rectification, on the one hand will delay the schedule to affect production, on the other hand increase investment costs. Material prices are sensitive to market fluctuations and related supply-demand relationships, international situations and other factors; if the increase is larger, it will directly affect project costs in the upstream business end of construction projects and squeeze profit margins. For engineering changes, certain geology conditions might be much higher than presented in the survey report and making the original design scheme too big to realize can force major changes and lead to cost escalation and time delays. One cannot ignore contract disputes either, as vague or subjective terms and conditions lead to various interpretations of the obligations and rights arising out of it, which can not only give rise to claims but also affect the seamless execution of the project [7].

5.2 Formulating Risk Response Strategies

An adequate scientific and reasonable response plan shall be formulated for high-risk items identified. There may be some common and impactful risks like material price fluctuations are recommended to use these combinations of strategies. For risk transfer, buy corresponding insurance to turn part of the risk handing it over to the insurance company; for risk sharing, negotiate fixed lump-sum contracts with suppliers clearly stipulating in the contract price fluctuation-sharing ratio; for risk retention, establish a dedicated reserve fund in order to cope with possible cost rise. Finally, reasonable risk thresholds should be established (e.g., a warning could be triggered if raw material prices rise more than 10%) Once the triggering, begin corresponding response measures as soon as possible for example amend procurement plans price adjustments with suppliers on the costs.

5.3 Building a Dispute Resolution Mechanism

It's very hard to completely avoid disputes while executing a project. When not managed properly, they can severely affect project cost and schedule. Thus, a tri-functioning and reasonable dispute resolution mechanism is inevitable. The contract is the implementation guideline for the project, thus, it must specify clearly how the dispute resolution mechanism would be. First of all, preference should be given to achieving consensus through friendly consultation that is at low cost

and efficiency. Which contribute to maintain the good relationship between both or among all sides. In case consultation fails, third-party mediation can be added using neutral and professional third parties who facilitate a settlement between the parties. If mediation fails, either go for, as per the contract, arbitration or litigation [8]. Arbitration has a distinct professional and finality; litigation is authoritative and enforceable. In addition, fixing time limits for handling the dispute is vital. Reasonable deadlines do not prolong constructive disputes, mitigates the risks associated with continuous rise in costs and schedules due to lengthy dispute resolution processes but it allows the project to progress as intended and achieve its aims.

6. Conclusion

Whole-process consulting for construction projects Whole-process cost consulting is a systematic work of whole-process coordination across all stages. Reaching investment objectives of the project is through strategies such as professional organization, digital tools, refined control system for risk prevention and control value creation. In the context of the accelerated digital transformation of the construction industry in the future, it is necessary for cost consulting to further integrate technologies such as BIM, big data and artificial intelligence to improve the intelligent service level and provide more efficient and accurate cost management services for construction projects.

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