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Research on cost control management of civil engineering

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ABSTRACT

With China's construction business project management system reform, the production methods and forms of construction of the organizational structure has undergone profound changes in the level of project management as a constraint to business survival and development of the first element. To figure out this phenomenon, this paper discussed the project management of key control points-cost management and control system, method and content of the system and conducted in-depth exposition of the use of systems engineering point of view. Starting from the basic principles of the construction project cost control, a comprehensive analysis of the structure, content project construction cost control method has been discussed. Based on the foundation of construction project cost analysis, this paper on has proposed corrective measures to seek ways to reduce construction costs.

KEYWORDS

Civil engineering; Project construction; Cost; Management; Buget.

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INTRODUCTION

Construction enterprise production and business purpose is the construction project through construction, to play in this enterprise technology, equipment, management capabilities, the rational allocation of production factors, optimize the construction program within the time stipulated in the contract to complete the agreed quality standards of construction tasks, obtain legitimate profits, and thus contribute to social progress. In the process of achieving this goal, as the cost of doing business center project is a major source of development relying on corporate profits and therefore its cost control is very important.

At present, the construction enterprises in project cost control is still in a primary, extensive, based on the experience level of management, cost control system, lack of energy, lack of a project manager incentives to stimulate creativity, competition and constraints mechanisms, specific performance[1]:

(1) Cost control positioning is unclear, its importance has not really been recognized by project managers and business managers.

(2) Unknown costs responsibilities among the various professional jobs, there is no clear dividing point between the cost of some items.

(3) Cost control procedures, missing link, the lack of a systematic program of cost control processes.

(4) Cost planning methods, the method is not scientific, empirical ingredients too, the lack of credible evidence and creative program supporting the program.

(5) Construction costs are often out of control, which factors are subjective factors project managers, control objectives sidedness, the lack of effective control measures and methods. Organizational aspects of project management failure, cost control, missing data, failed to form a project cost control database can be queried, cost control means backward and so on.

THE BASIC PRINCIPLE OF THE CONSTRUCTION PROJECT CONST CONTROL

The constitute of project construction costs

Direct cost refers to the process of constituting the construction cost of the entity or entities contribute to the formation of project expenses, including labor costs and material costs specific mechanical royalties other direct costs.

Indirect costs are those expenses each internal project manager to prepare, organize and manage the construction of the entire construction and production of construction costs, specifically including staff salaries and other employee welfare costs of labor protection.

The cost control of construction project

In ensuring compliance with design specifications and quality standards of the premise, the rational use of material and economical use of materials, through the quota management, measurement and management tools, and construction quality control, avoid rework, effectively control the consumption of material goods.

The price of the material is mainly controlled by the purchasing department in the procurement of material, because the material prices are set by the purchase price, transport fees, transportation reasonable loss and other components, so the control material prices, mainly through market information, inquiry, application of competition and economic means contracts and other control materials, equipment, engineering supplies purchase price, including the purchase price, freight, and wear and tear.

Take control labor costs and material costs the same control principle, the implementation of "separation of volume and price." Manual labor by the number of project managers and construction contractor labor contract, in accordance with the internal construction drawing budget, reinforced turn-like single or template to calculate the amount of the fixed artificial man-days, and safe production, civil construction and sporadic man-days of labor by quota a certain percentage (usually 15% -25%) contract together.

Machinery costs are mainly determined by the number of sets of classes and units priced two classes, classes for effective console expenses, mainly controlled from the following aspects:

Reasonable arrangements for the construction of production, equipment rental program to strengthen management, reduce equipment idle due to improper arrangement. Machinery and equipment to strengthen the scheduling work, try to avoid slowdown and improve on-site equipment utilization. Strengthen the maintenance of field devices, to avoid improper use caused by mechanical equipment parked. Good coordination and cooperation on the crew and auxiliary production staff to improve production.

On-site construction management fee occupy a certain percentage of the project cost, control and accounting are more difficult to grasp, projects and expenses greater flexibility when using mainly take the following measures:

According to on-site construction management fees in the proportion of the overall cost of the project construction plans, construction project manager to determine the total amount of construction management fees. Under the leadership of

the construction project manager, project manager prepare construction management fee of the total budget and the various management, construction management fee budget lines as on-site construction management fee of control basis. Develop project construction management of expenditure and scope of responsibilities of various departments to implement the control lines and positions. Develop and strictly enforce the approval of the construction costs of the construction project manager to use, reimbursement procedures[2].

THE COST CONTROL OPERATION OF PROJECT CONSTRUCTION

In the construction process of the project, the project manager should adhere to in accordance with the increase revenue, total control, combining the principles of responsibility and rights, the occurrence of actual construction costs were effectively controlled by the target management.

Materials and supplies construction projects, including turnover engineering entities constitute the major materials and components, as well as contribute to the project entity formed by the use of materials and consumables. From the value point of view, the value of materials and supplies, accounting for more than the price of the total project selection, its importance is self-evident nature.

Control of procurement and supply channels in the choice of material supply target, they should adhere to the "high quality, low price, the road near good reputation,, principles for the procurement of materials in all aspects of the work, combined with measurement of the material when entering storage acceptance, regular inspection and control[3].

Party supply control. Party supply of material is usually fixed by the construction unit according to the number of construction plans of the budget, according to the construction progress of the project, the construction unit be delivered. But in construction among other reasons because of design changes, inevitably physical quantities and project cost increase or decrease occur. Therefore, the number of materials engineering projects, projects must be based on the final settlement as a basis for the adjustment.

Procurement and supply situation of convergence with the construction schedule control. Enterprises should prepare "Material schedule," according to the construction schedule to meet the needs of engineering construction. But the actual control material supply schedules, sometimes appear to availability delayed and insufficient number of supply, especially in tight market supply of a material when it is inevitable. Therefore, you should use the material plan, and the supply time and the supply of various materials recorded on the "Material schedule", by comparing the actual feeding programs and materials, to check the extent of material supply and construction schedule interrelated, and material supply disconnected due to impact on the construction schedule.

Bid control. Bid changes are mainly caused by market factors, but in terms of internal control, should be investigated prior to suppliers to establish a qualified vendor roster. When purchasing, you must select the qualified supplier roster suppliers, implement shop around at the premise of quality and quantity, for a minimum purchase price. In addition, the material sector and materials needed for each project can be classified bulk purchases to reduce the purchase price.

The Shipping control. In order to reduce costs rational organization of material transport, the nearest purchase of materials, selection of the most economical methods of transportation,. To this end, material procurement department to require suppliers of packaging required conditions and the designated place of delivery, such as reducing packaging quality supply units, press payments increase due to changes in the designated place by the supplier pays the costs.

Loss of control. Acceptance of the project site material requirements for personnel strict acceptance procedures in a timely manner, accurate measurement, in order to prevent the loss or shortage included material costs.

In ensuring compliance with design specifications and quality standards of the premise, the rational use of material and economical use of materials, through the quota management, measurement and management tools, and construction quality control, avoiding rework and other substances in the effective control of material consumption.

Quota control. For consumption of fixed material consumption quota based projects, the implementation of quota system sends the material. Each project foreman can only limit prescribed stages recipients, recipients of the material requires more than the limit, you must first identify the cause, after a certain approval procedures before picking.

Indicator control. For fixed material is not consumed by the implementation of program management and control indicators approach. According to long-term real consumption, combined with the specific circumstances of the month and conservation requirements, develop requisitioned materials index, according to control hair material, exceeding the target material, must go through a vetting procedure before recipients as shown in Figure 1.

DeWoody with money, lump sum control. In the course of the materials used, on the part of small and sporadic materials such as nails, wire, etc. to adopt money on behalf of the objects, lump sum control approach. The specific approach is based on the quantities of materials needed for the settlement, which was converted into cash, issued to the construction team during the monthly settlement, once the package dead, the team with the materials needed, to purchase materials from the project staff, cost overruns in part by the team conceited, saving part of the proceeds go team.

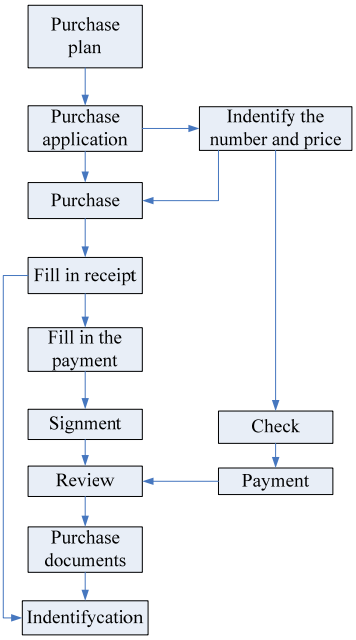

Figure 1 : The process of automatic controlled materials by project manager

Construction site temporary facility costs are an integral part of the project direct costs. In the project construction management in terms of reducing the construction cost, with hard and soft means two ways, means refers to the so-called hard-optimized construction technology solutions, value engineering approach, combined with the construction of the design suggestions for improvement, as well as the rational allocation of temporary construction site facilities, control the construction scale, lower costs fixed costs. Soft means mainly refers to strengthen management, improve efficiency and overcoming waste to reduce unit construction products materialized labor and living labor consumption. 2 is the relationship between construction output, construction costs and construction time monthly profit per unit completed map as shown in Figure 2.

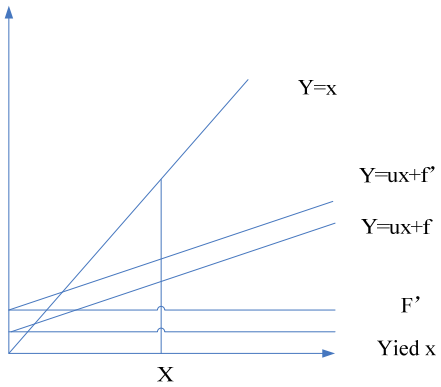

Figure 2 : Relationship of output, cost and profit

Where the total cost of construction is divided by the fixed and variable costs of two parts. As can be seen, if the value of the unit time to complete the construction as such as fixed costs, will enable construction profits decline, while the size of the fixed costs of the size and construction of various types of temporary facilities on-site configuration, construction machinery and equipment sets course fees, management personnel wages and so on. In order to control the size of the temporary site facilities, construction organization should be through careful design, to meet the planned duration of the construction speed requirements of the premise, as far as possible the organization balanced construction, to reduce the scale of construction, the number of all types of construction control configuration facilities.

Reasonable choice of construction machinery and equipment, the rational use of mechanical equipment is of great significance for project construction and cost control, especially in high-rise building construction. According to some project examples statistics, the total cost of high-rise buildings above ground portion, transport machinery accounted for about 6% - 10%.

Due to the different handling equipment have different uses and characteristics, so when selecting material handling equipment, you should first determine what combination of different ways to take handling equipment in accordance with engineering features and construction conditions, in determining what kind of when the combination should first meet the construction needs, while also taking into account the level and whether better overall economic costs.

PROJECT COST ANALYSIS

Project cost analysis is primarily a method of cost control for the project taken. That cost control, project costs incurred to analyze, analyze and find cost savings or overruns reasons, so as to achieve improved management, improve economic efficiency. Project cost analysis includes a comprehensive analysis and detailed analysis of two kinds.

Comprehensive analysis of the project cost. According to a comprehensive analysis of the cost of the project, the cost of the project is that labor costs constitute costs, material costs, construction machinery royalties, other direct costs and construction management fees. it is analyzed by a comprehensive analysis of the cost of the project to compare the actual cost of the construction costs and annual budget units. Through a comprehensive analysis of the project, it can be found to reduce project costs or overruns of the main reasons to take appropriate measures, the cost control within the target range.

Detailed analysis of the project cost. Detailed analysis of the project cost analysis can be divided into labor costs, material costs analysis, construction machinery royalties analysis, analysis of other direct costs, indirect costs, such as several analysis.

RENSIBONSIBILITY COST ANALYSIS

Liability costs in accordance with the requirements of economic responsibility of the project, project organization at all levels of responsibility within the system, break down the project overall budget content, the formation of "budgetary responsibility", called liability costs. Liability costs to draw a variety of economic responsibility of the project cost, the responsibility for the implementation of the budget be measured, recorded, performance reports regularly, is to strengthen the management of the project cost a scientific method[4].

Responsibility cost management requires the establishment of a number of responsibility centers within the enterprise, and their economic activities in the division responsible for the planning and control, responsibility center control area and the size of their area of responsibility, can be divided into cost centers, profit centers and investment centers. In the project organization, project management, engineering team, the team is a cost center, project economics department of government departments such as finance, technology, materials, etc. are also a cost center. According division of responsibilities and determine the different levels of "budgetary responsibility" to determine its liability costs, management and control.

NET GAIN VALUE ANALYSIS

We know that the basic principles of project management and control is based on pre-formulated management plans and control benchmarks conducted periodically in the implementation of the comparative analysis, and then adjust the plan to go back to the implementation of the plan. Effectively carry out the project cost, schedule control is the key to monitoring the condition of the actual cost and schedule, timely and regular basis, compared with the control photographs, and in combination with other possible changes, to take the necessary corrective measures to amend or update the project plan, forecast when the project is completed whether cost overruns, schedule in advance or backward. Visible, the main elements of project management is to control the quality, schedule and cost. Goal of project management is the prerequisite of ensuring the quality, schedule and cost of finding the optimal solution to ensure cost, schedule and effective control. Earned value analysis is the cost of the project and it is a comprehensive measure and a monitor the progress of effective methods. So, here we highlight earned value analysis is the evaluation of the project schedule and cost of the most sophisticated analytical methods budget.

Cost, schedule control, respectively, the traditional idea is to manage them, lack the necessary link between the two kinds of control, which is clearly open to question the existence of. For example, in the project to a stage when the cumulative cost and cumulative program budget to spend a considerable cost, but the actual progress has been accomplished and did not reach planned capacity, the results of the project budget has been exceeded and the remaining amount to complete the project as well, to complete the project costs must increase more, this time to plan to complete the project within budget cost control is already too late. This shows that the total actual cost and the cumulative budget cost comparison only shows one side, does not truly reflect the status of the project cost control.

Contact between cost and schedule are actually very close. The size of the costs and schedule of speed, lead or lag has a direct relationship. In general, the cumulative costs are proportional to the project schedule. But simply to observe the size and cost of consumption can not cost trends, the progress made is completely accurate and effective state estimation, schedule or cost overruns lead-lag costs savings will affect the size. That is, in the course of the project a certain point in time, only the monitoring plan and the actual costs of this consumption can not determine whether an investment cost overruns or savings, because the cost may be due to the consumption of large ahead of schedule, it may be because the cost of within budget. Therefore, to be truly effective cost control, the amount of money must be spent on the project continuous

supervision and with the progress of work on the contrast. Earned value analysis is just to solve this problem. Earned value analysis is a comprehensive measure of the project can progress, the overall cost of the status of the method, which uses the form of money instead to measure the progress of the project work, it is not how much money to invest to reflect the progress of the project, but in the capital has been transformed into the outcome of the project amount to be measured, is a complete and effective project monitoring indicators and methods. In particular, many applications in engineering projects are effective.

THE PROJECT COST VARIANCE ANALYSIS

Deviation of the number of project cost analysis, construction cost of the project is to analyze deviations from budgeted costs compared with each other, planned cost and actual cost of the shortcomings to find a cause, so as to promote the project cost analysis, cost management to promote and improve the level of cost reduction. Cost comparison between the results of each other, respectively, plan deviation and actual bias.

Program that is budgeted cost deviation compared with the planned cost difference reflects the cost of pre-pre-control achieved goals, plans deviation is calculated as follows: Plan deviation=estimated cost-plan costs.

Here refer to the estimated cost of construction drawing budget costs, the estimated cost of the tender contract target cost and project management responsibility for three levels of budget costs. Program cost is the cost that is the target site construction budget. Deviation between the two plans were also reflect differences in the average plan costs and social costs, plan costs and competitive price difference costs, the cost difference between the budget and business plan target cost. If you plan deviation is positive, reflecting the cost effectiveness of the pre-control plan, the planning process also reflects the wisdom and experience of managers in investment results.

That plan costs and actual deviation compared to the difference between the actual cost to reflect the performance of construction project cost control, but also reflect the level of cost control and assessment project basis, calculated as follows: the actual deviation= planned costs-actual cost.

Analysis of the actual deviation purpose is the implementation of the inspection program costs. Its negative difference reflects the shortcomings and problems that exist in the cost control program, tap the potential of cost control, reduce and correct target deviation, to ensure the realization of the planned cost.

Cost control deviation analysis is the key, correction is the core. Measures to control the costs of organizing the activities of enterprises, in order to make the project cost at a minimum to maintain the degree of consumption, to achieve effective control of the project cost, the cost should be the responsibility of the project manager decomposition implemented in various positions, and to the person, the whole process of cost control, full control, dynamic control. The formation of a clear division of labor is the cost of responsibility to the people's control responsibility system.

Technical measures during the construction phase should do more to prepare technical and economic comparison of different construction program, the method in this area a lot, such as value engineering, OR methods, integrated approach, ABC analysis, the amount of principal and interest analysis method.

Economic measures include a variety of programs do a good job forecasting and cost costs. On a variety of expenses, should do a good job of funds use plan, and strictly control the expenditure in construction.

Contract selection is critical contract management measures appropriate contractual structure of the project. In the provisions of the contract should be careful to consider all factors that affect the cost and efficiency. In particular, potential risk factors, caused by changes in the cost of risk factors to identify and analyze, to take the necessary risk countermeasures.

CONCLUSIONS

The ultimate goal of the project management of construction enterprises is a low-cost, high-quality and short duration to achieve greater profits where low cost is the foundation and core of this goal. The level of cost management defines the number of enterprises directly affect profits. By taking various measures to reduce the project cost, we can improve the profitability of construction companies to achieve business goals profits and to create good economic returns.

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