Research on Complex Ship Cost Based on Earned Value

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Abstract: The research, development and manufacturing of complex products are characterized by high technology to overcome difficulties, high knowledge intensity, high product quality requirements and long project cycle, etc. The production and management ability of complex products is the embodiment of whether the national design and manufacturing ability is strong. In this paper, based on the characteristics of complex ships, the earned value management method is proposed to provide a theoretical guarantee for the efficient management of ship projects.

1. Introduction

Effectively managed ship projects require a comprehensive and comprehensive consideration of various factors, including key factors such as cost, quality and schedule, to effectively manage, monitor and evaluate the project. In general, once the construction price of a ship construction project is determined, only by controlling the implementation cost of the project can the final income be realized. However, it should be noted that cost reduction should not affect the quality and duration of the project. For the three mutual influence, mutual restriction of the situation. Therefore, it is critical to conduct research on schedule and cost in combination with difficulties in shipbuilding on the theoretical basis of earned value, and to control the whole process of shipbuilding from all aspects.

2. Relevant Conceptual Basis

2.1 Ship Project

Ship project, simply speaking, refers to the ship construction period, from the beginning of the project to the end of the delivery of the ship needs to carry out all the work. The ship project needs the support of technology. The technology here not only refers to the professional construction technology of the ship, but also includes the construction period, front-line production staff, management personnel, design and cost, etc. The perspective from the project control, Marine projects can also be understood as staff in order to achieve the hull of the owner satisfaction and do their best to build, or the time limit prescribed by the owner, under the premise of, in the face of some controllable and uncontrollable conditions under the restriction of resources such as carried out by all and sign relevant project plan and the actual work of synthesis.

2.2 Ship Cost

Ship project cost control system is based on the characteristics of ship construction combined with project cost information from the beginning to the end of the project cost management process. In ship control in the process of the project, at the start of the project according to the requirements of the project construction and control target of WBS decomposition, and then make the project schedule management, cost compared with the budget, scientific selection of projects in each link of the inspection time, collect related cost data and progress deviation causes data analysis, and correct deviation under control.

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2.3 Winning Value Theory

Winning value management, as a cost management method of comprehensive measurement of construction cost and project progress, does not reflect the completed progress of the project by the amount of funds invested, but calculates the completed workload of the project in the form of money, and represents the amount of project completed results with funds. In the project cost management, the earned value method can effectively manage the schedule and cost.

There are three basic parameters in earned value management, They are respectively BCWS (Budget Cost of Work Scheduled), ACWP (Actual Cost of Work Performed), and BCWP (Budget Cost of completed project Performed), the cost deviation, schedule deviation, cost performance index and schedule performance index can be obtained by relevant calculation of the three parameters. The reasons for the deviation should be analyzed in management and relevant corrective measures should be implemented in time.

3. Improved Earned Value Application Research

3.1 Difficulties in Complex Ship Cost Management

(1) High difficulty in cost accounting

Large and complex products require raw materials or auxiliary materials of different varieties and models, as well as a variety of professional machinery and equipment. They can only be delivered to customers after complex production processes, professional assembly activities and quality inspection. In such a production process full of complexity, the accounting of parts, the management of project progress and the division of responsibility cost will inevitably bring high difficulty for the cost accounting.

(2) It is difficult to construct the cost reference system

In the cost management of complex products, the standards of different industries have been formed, but it is difficult to form a common cost management system for all complex products. Moreover, because of the ordering nature of complex products, its low repeatability is determined, then the cost data of this department is unlikely to provide effective cost information for the project of the next cycle.

(3)Complex organizational management structure and process

Complex products are characterized by long cycle and high investment, which determines the intersectionality of their organizational structure and processes. The organizational structure of complex product projects generally includes the company, R&D, management and production departments to the production site. In the process of project management, in order to save the information cost and effectively manage the cost for different task packages at different levels, it is necessary to determine a scientific and full coverage of the project production process of the plan management process, so as to enhance the project personnel's awareness of the whole process.

(4)Change information management requirements are high

The larger the project size of a complex product, the larger the number of project change events that occur, and the larger the amount of change information that occurs. Moreover, not only in the event of change, but also in the daily production activities, a large amount of data is generated due to the complexity of the product, and the cost of processing information will increase continuously. Change events occurring in the project, means multiple departments and different levels of internal information and cooperation of production, etc., the transmission of information will increase information processing costs, identify whether the change information real work effectively is a difficult problem, from the project contract signed to the subsequent change in the product after-sales service phase information management not only need to multilayer information collaborative environment, It also requires staff sensitivity to cost information and good information business processes. Only by ensuring the effective degree of change information can work efficiency be improved, cost is reduced and enterprise competitiveness is enhanced.

3.2 Specific Steps to Apply Earned Values

A. Manage the project cost budget and schedule, make statistics of its information, divide the total budget into each statistical node, calculate the product of unit budget cost and planned project quantity, add the resource load distribution value according to the time cycle, and draw BCWS curve.

B. Set up the winning value statistical table, fill in the results of the actual project completion schedule and unit budget cost, calculate the product of the two to get the winning value of each statistical node, add the winning value according to the time distribution to get the cumulative winning value, and finally get BCWP curve.

C. According to the actual construction schedule and the actual unit cost of product obtained ACWP numerical and graphed, before the start of the project, project managers will be part of the work in the project bidding, outsourced contractors to finish, before the contract, both parties will sign a related contract, rules work quota and the specific contract price. During the outsourcing work, the construction company will allocate appropriate amount to the contractor according to the circumstances. The cumulative amount of each allocation is the product of the cumulative amount of work completed and the unit cost, known as ACWP.

D. The three basic parameters of BCW S, BCWP and ACWP were obtained according to the above calculation method. The schedule deviation and cost deviation were obtained through basic calculation, and the curves of BCWP and ACWP were compared.

E. Conduct deviation analysis and take effective corrective actions. Different deviation results reflect the causes of deviation and correspond to different corrective measures. Cause analysis should take into account the current situation of project management and the market background of the industry, not just limited to the value itself. Corrective measures also need to be combined with the actual situation of the project, which should be targeted and feasible, so as to prevent the occurrence of similar causes of deviation and strengthen the control. Specialized managers are required to count all kinds of deviation and causes, so as to provide reference information for the follow-up management of similar projects.

(1) Generally, there are several reasons for cost deviation:

① Management: the organizational structure is not rigorous enough, there are management loopholes, and the capital approval process is over-controlled and lax, resulting in corruption; Employees have no awareness of cost control and lack of incentive mechanism.

②customer aspect: the requirements of customers for the project in the early stage of the project are not clearly expressed or difficult to achieve, resulting in the early stage of the project design scheme is wrong and can not be well formulated follow-up plans.

(2) Generally, there are several reasons for progress deviation:

① Supplier: after the enterprise signed the purchase contract with the supplier, the supplier failed to deliver the goods as agreed, which led to the project progress could not be carried out as planned and the progress was delayed;

② engineering design: the design department coordination is ineffective, the design scheme is not determined on time, and frequent changes; The design department lacked a holistic view of the project and an accurate understanding of the customer's needs.

③Shipyard: the level of professional technology can not be improved, independent innovation ability is insufficient; The design scheme is unreasonable and the manpower arrangement of the construction scheme is not scientific enough. And other force majeure and other factors caused by deviation.

F, forecast the trend, according to the above parameters and indicators of the development curve, forecast the future expenses and progress.

4. Conclusion

For high-tech shipping enterprises, the implementation of project cost control based on the

earned value method is in line with the actual needs. Shipping enterprises should continuously improve their design ability, optimize project management, and perfect the management system of earned value method, so as to strengthen their cost control ability, improve the level of enterprise earnings, and thus promote the sound development of enterprises.

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