Cost Control Analysis of Construction Stage of Assembly Building based on Project B

Junxiao Yao, Yi Chen *
School of Management, Tianjin University of Technology, Tianjin, China.
* 1239519848@qq.com

Abstract. In this paper, through the analysis of the relationship between the cost progresses of the construction project in the Hongkou District of Shanghai, the integrated control process of the cost progress in the construction phase is compiled by using the earned value method and the work breakdown structure. This paper will introduce the cost and schedule variables based on the earned value management theory. By collecting and calculating the construction project usage, budget, actual consumption and budget gap, etc., we can verify the cost control measures suitable for the construction stage of the assembly building.

Keywords: integrated control; schedule variables; cost control measures suitable.

1. Introduction

With the acceleration of urbanization in China, prefabricated buildings cater to the rapid development of modern housing construction industry due to its short construction period, energy saving and environmental protection. A large number of literatures analyze the cost of fabricated construction projects, and Jiang Qinyu proposed a technical route and guidelines for adapting the development of fabricated buildings in China [1]. Zhang Li, Ji Shengliang, Hou Wei, Tang Junyong proposed the use of earned value method for project schedule and cost integrated management, and constructed the earned value management system of China's construction projects[2].Wang Chunzhen established the concept of overall dynamic control of the three goals [3].Liu Peng has reference value for engineering project management research and practical project management [4]. The results show that the application of professional knowledge to co-ordinate and control the two goals, in the process of processing the relationship between the two to obtain the maximum benefit and minimum investment, can effectively reduce the cost of the prefabricated construction phase.

2. Cost Control Analysis Model for Prefabricated Building Construction Stage

2.1 Decompose Project Work with WBS

The project work breakdown is shown in Figure 1. After the work package design is completed, each work package needs to be structurally coded and decomposed. Before the official start of the project, the relevant leaders of the company will integrate and manage the progress and cost of the project according to the relevant indicators of the earned value method according to the specific process table.

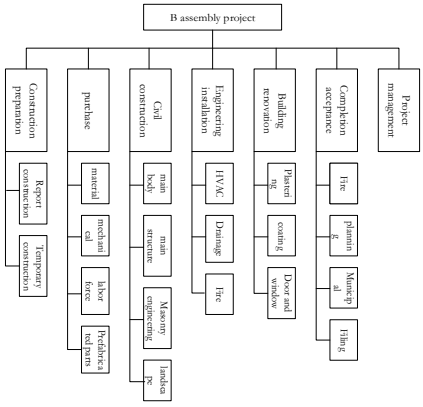

Figure 1. Project work breakdown diagram

2.2 Determination and Implementation of the Assignment of Work Responsibilities

In this paper, according to the participation of various departments in the project and different responsibilities, the management is divided into four levels: responsibility, participation, supervision, and approval. As shown in Table 1

Table 1. B project responsibility allocation table

mission name	Project Management Department	Human Resources Department	Finance department	Technical department	Engineering department	Purchasing Department	Quality Assurance Department	project manager
Site leveling	participate	participate	participate	participate	Be responsible for			Approval
Temporary facilities	participate	participate	participate	participate	Be responsible for			Approval
Material procurement	participate	participate	participate	participate		Be responsible for	Supervision	Approval
Infrastructure construction	participate	participate	participate	participate	Be responsible for		Supervision	Approval
Engineering construction	participate	participate	participate	participate	Be responsible for		Supervision	Approval
Drainage installation	participate	participate	participate	participate			Supervision	Approval
Electric coal installation	participate	participate	participate	participate			Supervision	Approval
Telecommunications installation	participate	participate	participate	participate			Supervision	Approval
system debugging	participate	participate	participate	participate			Supervision	Approval
Interior and exterior decoration	participate	participate	participate	participate	Be responsible for		Supervision	Approval
Experimental acceptance	participate			participate			Be responsible for	Approval
Data acceptance	participate			participate			Be responsible for	Approval
Project delivery	Be responsible for			participate				Approval
Project management	participate	participate	participate	participate	participate		participate	participate

2.3 Project Implementation Supervision and Deviation Analysis

According to the time period, the monthly integration plan is formed, and the project completed every month is supervised according to the cost schedule integration plan. The cost deviation and the progress deviation are obtained through comparison, and the causes of the deviation are analyzed, as shown in Table 2.

Table 2. Specific schedule of each stage of cost schedule integration management

Progress (month)	This month's planned budget (ten million)	Actual payment for this month (ten million)	Planned work budget (10 million)	Actual cost of completed work (10 million)	Work budget has been completed (ten million)	Expendable resources budget (10 million)	Cost deviation	Schedule deviation	Cost performance	Schedule performance	Project cost	Estimated project cost
One	2.50	2.50	2.50	2.50	2.50	2.50	0.00	0.00	1.00	1.00	13.85	12.34
two	1.15	1.20	2.78	2.90	2.88	2.83	-0.04	-0.02	0.97	1.02	13.08	10.36
three	1.21	1.18	4.25	4.28	4.26	4.24	-0.03	-0.02	0.99	1.01	13.08	9.00
four	0.75	0.79	4.75	4.87	4.79	4.81	-0.06	0.02	0.99	1.01	13.11	8.24
Fives	0.80	0.87	5.55	5.68	5.61	5.65	-0.03	0.04	0.99	1.01	13.02	7.34
six	0.70	0.69	6.25	6.37	6.30	6.35	-0.02	0.05	1.00	1.01	12.99	6.62
Seven	0.80	0.78	4.35	4.33	4.34	4.40	-0.05	0.02	1.00	1.00	12.53	7.72
Eight	0.75	0.75	7.00	7.12	7.10	7.13	0.01	0.03	1.01	1.01	12.93	5.81
nine	1.30	1.35	8.30	8.47	8.26	8.40	-0.07	0.14	1.01	1.00	13.06	4.59
ten	1.20	1.24	9.61	9.71	9.63	9.69	-0.02	0.03	1.00	1.00	12.98	3.27

According to the data summary of Table 2, the construction progress is the X-axis, and the engineering cost is the Y-axis. The earned value evaluation curve of the project can be drawn. The evaluation curve is composed of the combined influence values of PV, AC, and EV of each activity. It is difficult to see the specific progress from the earned value evaluation curve, so the deviation evaluation curve of the two variables is drawn according to Table 2, as shown in Fig. 2. Blue line indicates cost deviation, Red line indicates progress deviation

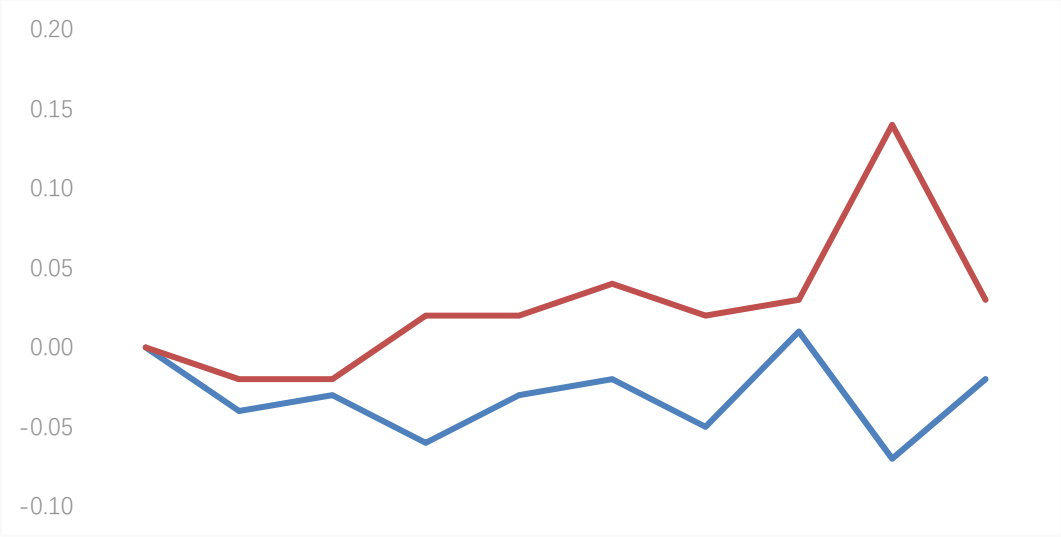

Figure 2. First stage deviation analysis

3. Cause Analysis

3.1 Variable Selection

In the preparatory stage, the B project calculates the relationship between prefabrication ratio, cost and duration by fully considering the prefabrication related design, engineering and cost.

Table 3. Costs and schedules at different prefabricated scales

Prefabricated ratio (%)	Cost (RMB/m²)		Duration (d)
	material	Artificial	
20	1650	750	550
25	2000	700	520
30	2350	650	495
35	2700	600	475
40	3050	550	450
45	3400	500	420
50	3750	450	405

Based on the above data, it can be found that in the range of prefabrication ratio of 20% to 50%, the prefabrication ratio is increased by 5%, the material cost is increased by 11% to 21% due to industrial production, and the labor is reduced by 6% due to the labor saving on the construction site. the total cost increased by 8% to 12%, and the total construction period saved 3.6%-5.5%. Under the prefabricated residential system, the relationship between cost and schedule can be more reflected. As shown in Figure 3.

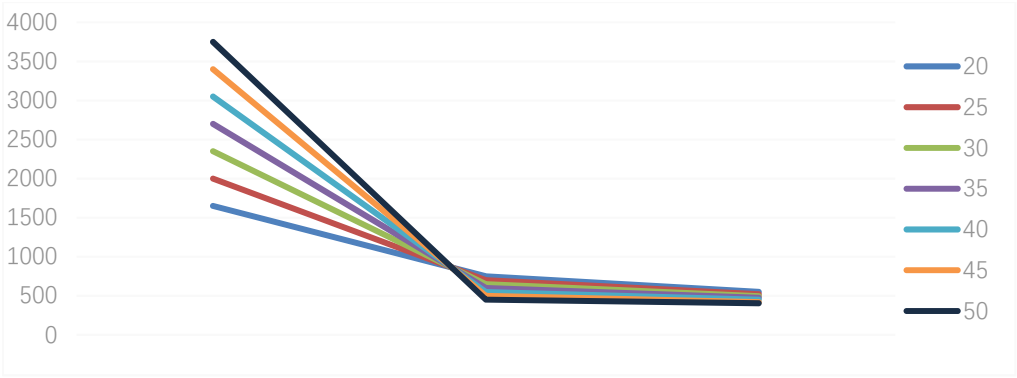

Figure 3. Cost and schedule trends at different prefabricated scales

3.2 Analysis

It is necessary to strictly control, strictly control the cost of each stage of the project, fully consider the possibility and trend of price changes at various stages of the project, and set aside sufficient funds in a timely manner. At the same time use advanced materials to avoid the occurrence of cutting corners. And to make a clear division of labor, to clear the division of labor of various departments, to avoid overlapping of duties between the divisions, to avoid duplication of work, in addition, the smooth implementation of the project requires the coordination and coordination of various departments.

4. Conclusion and Outlook

In this paper, the concept of pre-production ratio is introduced in the integrated management process of the project, so that the project management party can adjust the pre-production ratio in time according to the specific conditions of the project implementation, optimize the cost schedule in time, and finally realize the project management objectives. Apply a sustainable perspective by combining earned value methods, work breakdown structures, prefabricated scales, and prefabricated building projects.

Although this paper constructs an integrated management model of cost schedule in the stage of prefabricated building construction, due to its limited research level, there are still many shortcomings to be further studied by future researchers: cost schedule management in the stage of prefabricated building construction At present, the research in China is still in its infancy, and the related theoretical and case studies are even rare. The ability to form theory is insufficient, and researchers in the future are expected to supplement it.

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