Sensitivity Analysis and Evaluation of Cost Resource Allocation based on New Equipment Put into Production

-- Take Lean Line as an Example

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Abstract

The sensitivity analysis is helpful to find a more advantageous resource allocation scheme in the case of limited total project cost. There are four kinds of cost elements in C Company's equipment investment in this project, and this sensitivity analysis aims to analyze the four major factors for the overall cost of input. The major known uncertainties are equipment purchase costs, equipment installation/operator costs, project developer costs, and site area costs. This analysis will use C Company's Actual Equipment R & D data for analysis, using sensitivity analysis method, under the limited total cost, to obtain the best cost resource allocation.

Keywords

Equipment Development; Resource Allocation; Sensitivity Analysis; Cost Target.

1. Introduction

Costs include project development team costs, which are synchronized to prepare the project team for a smooth run of the project, only the basics are prepared, and at the beginning of the project, before the cost of equipment investment project including equipment input, especially in the selection of function, need to produce the products of equipment, select, determine the equipment. The cost includes the cost of the equipment hardware after the investment is completed, the cost of the lean line has already covered the cost of the equipment hardware, and needs to face the salary cost paid to the operator immediately, next is the cost analysis of lean line's main operating equipment, including the cost of equipment area, including a very variety of types, mainly to the main equipment, work areas, material areas, logistics channels, as the main factor to consider, such as the place area of tooling.

2. Review of Research Status

During the production of C Company's equipment, we carried out analysis at the start-up investigation stage of the project and began to sort out the known data. Finally, we could describe all the known parts of the project, namely: C company orders A products for the production, planning to build eight lean line equipment procurement, investment planning and cost 1 million, total production of the project development cycle for 3 months, according to staff A total of 17 people, team daily wages is 3700 yuan, install the man-days wage of 200 yuan, A total of four operating pilot installation, the installation time for A month, equipment area including the main body/accessories/personnel/logistics covers an area of 144.48 m², total area of the lease for 20 yuan / m² / month, on the assumption that, after the completion of construction project operation can generate profits, as required under the project according to the total cost budget, How to allocate the cost of each resource to complete the project as soon as possible and obtain economic benefits. Since there are fixed cost objects among the four cost objects of the equipment put into production project, assuming that the project still cannot be

completed after a long time, the default cost will always rise positively. Therefore, the COST formula can be listed as follows: COST= equipment production COST, operation and installation personnel COST, project development team COST, area, floor space COST

3. Research Methods and Data Processing

3.1 Research Method

Shen Huiping[1]explores the field of machines through sensitivity analysis, Tran Le Na[2] uses sensitivity analysis to consider the effects of steady-state energy modeling on Energy Monitoring Data, Choi Wonjun[3] assesses the uncertainty in the output or estimated parameters of the model, Zhang Jian[4] applied uncertainty and sensitivity analysis to engineering, Abiz Mehdi Rezaei[5] also needs to look for key factors in the field of microparticlesLamboni, Matieyendou[6] suggests improving the model's ability to distinguish between relevant variables, Shi Hong[7] believes that many factors affect the state of thermal performance.

In the implementation stage, the important factors to be paid attention to, the importance of each factor was analyzed, and the more sensitive factors were identified and controlled. When the cost is invested in different resources, many resources are limited in quantity or have time requirement. If we don't identify and manage the different types of cost items scientifically, it may cause the cost input, it didn't work out the way it was supposed to. Therefore, for cost management, we need to select the appropriate management tools from the management perspective, such as the process research of overall matters, the definition of different types of costs, the clear cost objectives, the sensitivity analysis of input resources, and the implementation of the process control measures, so as to ensure that the expected results of things, to achieve better cost objectives.

3.2 Data Processing

First is the change of total equipment input cost, through the change of equipment input, observe the change of other factors, through the increase or decrease of equipment cost percentage-30% ,-20% ,-10% , 0,10% , 20% , 30% , observe the change of other factors, The specific data are shown in Table 1.

Table 1. Data of Observation Table of Sensitivity Coefficient of company C's equipment investment project

Increase or decrease percentage	-30%	-20%	-10%	0	10%	20%	30%
Total equipment input	305200	348800	392400	436000	479600	523200	566800
Operation and installation cost	83250	166500	249750	333000	416250	499500	599400
Project development team cost	16320	18480	21120	24000	26400	30000	32400
Area budget	5721	6762	7629	8669	9536	10403	10836
Total equipment budget	410491	540542	670899	801669	931786	1063103	1209436

4. Sensitivity Analysis Calculation Process

According to the table above, the sensitivity coefficients of the four factors to the total project cost can be calculated respectively. Using stz= ($\triangle$ A/a)/($\triangle$ F/F) = 1.63, it shows that the equipment investment budget increases by 1% and the total cost budget increases by 1.63% , the sensitivity coefficients were general and the results were influenced. The sensitivity of the development team cost increase to the overall cost effect can also be calculated. SYF = 1.41. Based on the project team's overall view, the sensitivity of other factors can be calculated. Combined with the overall equipment cost budget, the cost ratio is 43.6%, therefore, selecting equipment investment as the key factor of cost control, focusing on the selection of equipment investment, focusing on the function of the key to the overall cost control.

5. Conclusion and Inspiration

This article focuses on the introduction of key equipment into the project, the introduction of equipment for the cost management, and take company C as an example, in 2018, the introduction of lean line equipment as the object of specific analysis: Before the lean line equipment input, the cost management has basically been carried out on the sensitivity analysis of various factors, it helps us to determine the optimal ratio of personnel/equipment/project time/area. In the project stage, we will encounter the purchase of equipment facing different regions, brand choice, will have a huge difference in cost and performance, therefore, in the project survey stage, we need to investigate the advantages and disadvantages of various brands on the ground, based on the objective result, the equipment investment is made uncertain decision. When selecting different pilots to operate the equipment, many high-value equipment need very high-level engineers to debug, and relatively high-knowledge operators can understand the operating procedures. Therefore, in personnel selection, following the level of the equipment, need to configure different levels of staff capacity and personnel. For a given capacity target, as well as the cost target, we have to determine the impact of an element on the results of the selection of different levels of configuration. On the basis of previous studies, this paper reexplores and studies the cost of developers, equipment purchase funds, equipment operators and the cost of floor space, the cost factors are analyzed again, and the management tools are used to control the cost factors to ensure the cost management objectives of the equipment project.

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