

Research on Adjustment in Contract Sum Caused by Item Characteristic Discrepancy—Code of Bills of Quantities And Valuation for Construction Works 2013

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Abstract. Item characteristic discrepancy can lead to readjustment of all-in unit rate. However, in the field of project management, the analysis of the determination of the new all-in unit rate is rare. So this paper aims to find the new ideas of determining the new all-in unit rate when item characteristics appear inconsistent. This study will be divided into the following steps. Firstly, three specific forms of item characteristic discrepancy will be determined by the analysis of relevant documents. According to three specific forms, the scope of the contract price adjustment will be defined; Secondly, the affecting factors of the new all-in unit rate will be analyzed, and then the new ideas of determining the new all-in unit rate will be offered. The new all-in unit rate which is caused by item characteristic discrepancy can be taken into account by learning from this study.

Introduction

There is a common phenomenon that the description of project characteristics is inaccurate or unclear, which is lead to disagreement and even lead to disputes and claims^[1]. " Valuation Specifications for Bill of Quantities in Construction Projects " (GB50500-2013) (Abbreviated form as "13 List") take item characteristic discrepancy as one of the contract price adjustment matters to explain. However, the principle and method of determining the new all-in unit rate are fuzzy^[2]. Project characteristics is not only a basis of distinguishing listing subheadings, but also a premise condition of determining the price adjustment, and then the new all-in unit rate's rationality will affect the price settlement of the project^[3]. So both developer and contractor more incline to find a basis and method of determining the new all-in unit rate to deal with disagreements effectively when the matter of item characteristic discrepancy happens in order to achieve some objectives, such as the efficient of contract price adjustments, reasonable claim etc.

In the field of the research of project cost management, the research on the description of item characteristic mainly reflected in description principles^[4], description highlights^[5]etc; the research on item characteristic discrepancy of 13 bills mainly reflected in preventive measures^[3], analysis of causes^[3], and influence on the project cost^[6]and processing mode^[7] etc. Few scholars have studied the problem of determining reasonably the new all-in unit rate when item characteristics appear inconsistent. So the analysis of determining the new all-in unit rate which is caused by item characteristic discrepancy is the focus of this paper.

Definition of research object

The concret manifestation of the item characteristic discrepancy. The characteristics of the project is essential characteristics of its own value, which is composed of work sections and trades and preliminaries^[8]. This paper summarizes the specific performance of item characteristic discrepancy shown table 1 by the analysis of "standard method of measurement for building construction and fitting-out words"(GB 50854-2013) in work sections and trades and unit rate preliminaries.

Table 1 project characteristic analysis of work sections and trades and unit rate preliminaries

Classification		Work sections and trades															preliminaries					
Specific items		①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩	⑪	⑫	⑬	⑭	⑮	⑯	⑰	⑱	⑲	⑳	㉑
Specific aspects	Incompatible materials	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√				
	Discrepancies engineering structures			√	√	√	√												√	√		√
	Discrepancies specifications, Installation location				√	√	√		√	√	√	√		√	√		√				√	

Note:①Earthwork ②Foundation and shoring ③Piling work ④masonry ⑤Concrete works ⑥Structural Metal work ⑦Structural timber work ⑧Door and window ⑨Roofing and waterproof works ⑩Reservation ,insulation and preservative work ⑪ Flooring finishing works ⑫Wall, column finishing and partition, curtain wall ⑬Ceiling works ⑭Paint, coating, paper works ⑮Other fitting-out works ⑯Scaffolding ⑰Framework and support ⑱hoisting ⑲Excessive height works ⑳Large equipment loading, installation and disassembling Water dispersion, ㉑dewatering

Table 1 shows whether it is work sections and trades or preliminaries, concrete manifestations of projects characteristic discrepancy can be broadly classified into the following three categories: 1) Incompatible materials; 2) Discrepancies engineering structures; 3) Discrepancies specifications, installation location. Once one of them happens, price adjustment events will occurs inevitably. Therefore, the three specific performance should be paid more attention to.

The determination of the scope of the contract price adjustment caused by item characteristic discrepancy. The relevant provisions of the 13 list stipulate that the change of all-in unit rate increase or decrease which is caused by project characteristics discrepancies should be determined reasonably in accordance with the project characteristics of the actual construction. Therefore, this paper focuses on the analysis of how to determine the new integrated unit price when the event of project characteristics discrepancies happens. The integrated unit price is made up of labor cost, material cost, construction equipment usage fee, enterprise management fee, profit and risk cost in a certain range. Enterprise management fees and profits are obtained by taking all or part of the the sum of first three fees as the base and multiplying by the corresponding ratio. So the determination of the integrated unit price is finally decided by the adjustment of the fee of labor, materials and machinery. According to the analysis 1.1 and 1.2, the analysis of price adjustment focus on determining all-in unite rate.

The analysis of the price adjustment caused by incompatible materials

Using incompatible materials will lead to two results: 1) The adjustment of the price in the case of the original construction technology. Merely replaced material prices need to be considered under the circumstances when the new all-in unit rate is determined. 2) The adjustment of the price in the case of the change construction technology. In this case, the new all-in unit rate will be determined by a variety of factors including the change of new material price, the change of cost of labor and mechanical fee etc.

The analysis of price adjustment in the case of the original construction technology. In this context, the determination of all-in unit rate is to replace the material price. So we have to determine the price of material. There are many methods for determining the price of materials, such as market guidance price, market inquiry price, similar product valuation, daywork labor etc[9]. However, each method has advantages and disadvantages. For example, if New material prices is determined with the price of information value, choosing the month of publishing prices will be inevitable. For general engineering, material information price in the period of bid quotation will be choose. However, If the material price fluctuations are too large, the use of such methods will encounter adjustment bottleneck[10]. Therefore, the contract should be taken as the supreme criterion when both parties adjust the integrated unit price, and then determine the price of the

material according to the relevant pricing method. The specific situation of determining material prices is shown in FIG. 1.

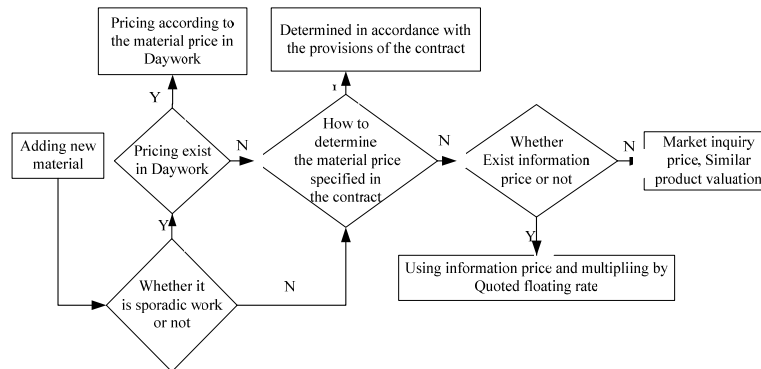


Fig. 1 The determination of material price

According to figure 1, the determination of the price of the material contains the following steps: firstly, the engineering quantity of price adjustment projects need to be determined. Secondly is, judging whether it is odd jobs or not. If it can be identified as odd jobs, the material price can be calculated with the material price in daywork. If not, the material price can be calculated with information value. At the same time, quoted floating rate should be considered. Thirdly, if information value is missing too, the method of market inquiry and the method of similar product valuation can be used to determinate the adjusting price. The formula of the new price determination is as follows.

New contract price = Original contract price + (New material price - Original material price) × engineering quantity (1)

The analysis of price adjustment in the case of the change construction technology. Compared with the case of original construction technology, the determination of the new all-in rate is not only to consider the changes in the cost of materials but also consider the changes in labor costs and machinery costs.

(1)The adjustment of the material price. Whether the construction process change or not, the determination of material price is the same,. Thus, it is not repeated here. Thus, it is not repeated here.

(2)The adjustment of labor costs and machinery costs. There are two possible situations on the change of labor costs and machinery costs caused by the change of construction technology, one is to meet new professional and technical and another is to meet the increasing number of original professional and technical. In this case, the operating mechanism of price determination is consistent with the material prices. The specific situation of determining machinery costs and labor costs are shown in FIG. 2.

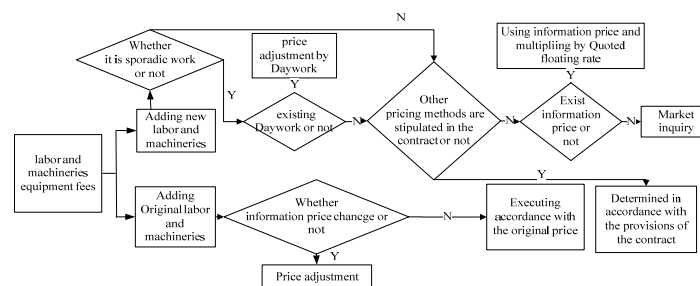


Fig. 2 The determination of labor and machinery equipment fees

Fig. 2 illustrates the price adjustment mechanism of determining new labor cost and equipment cost. According to the 9.8.2 provisions of the 13 list, contractors should agree the range or extent of the main materials and equipment prices. If not and its unit price changes by more than 5%, the contract price should be adjusted by calculating the difference according to the price adjustment formula in 13 list.

The analysis of the contract price adjustment caused by discrepancies engineering structures and specification, installation location

The analysis of the contract price adjustment in case of the discrepancy engineering structures. Engineering structure refers to the space frame system of the building, which is composed by the three parts of vertical bearing system, horizontal bearing system and substructure^[11]. The discrepancies engineering structures can lead to the cancellation of the original list item, resulting in a new items of list or the change of the original list items. All-in unit rate should be determined again when new items generate. And the change in the original list of projects is only the changes of the original artificial, material, machinery costs. The concrete situation is shown in figure 3.

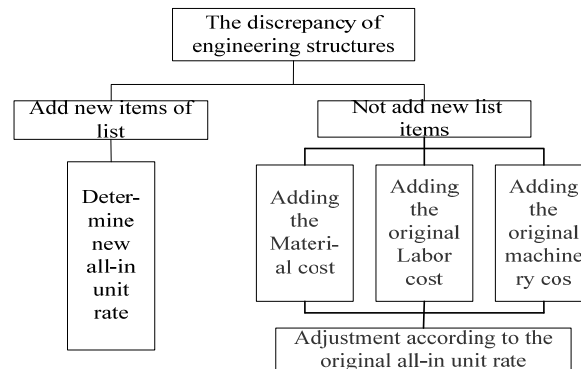


Fig. 3 The analysis of the determination of all-in unit rate in the case of the discrepancy of engineering structure

In terms of adding new list items, the method of new all-in unit rate is consistent with this situation in which discrepancies of using material cause the change of construction technology. And for the situation of no new projects of list, when all-in unit rate is determined, comparative analysis should be used. Namely, labor' and machinery' consumption vary on basis of the original quotation list. At the same time, the unit price of labor and each machinery should be executed in accordance with the provisions of the contract and material fee is not adjusted. And then, calculating management fees and profit by using corresponding bid rate. At last, new integrated unit is determined. In summary, in this case, the formula of the determination of the change all-in unit rate is as follows.

Labor cost=Labor consumption in the contract \times (1+Adjustment factor of the artificial ergonomics of construction conditions) \times Labor unit price in contract (2)

Mechanical cost= Mechanical consumption in the contract \times (1+Adjustment factor of the mechanical ergonomics of construction conditions) \times mechanical unit price in contract (3)

Material cost= Mechanical consumption in the contract \times Material unit price in contract (4)

New all-in unit rate= Bid all-in unit rate+(Labor consumption in the contract \times Adjustment factor of the artificial ergonomics of construction conditions \times Labor unit price in contract + Mechanical consumption in the contract \times Adjustment factor of the mechanical ergonomics of construction conditions \times mechanical unit price in contract) \times Management rate and profit rate (5)

The analysis of the contract price adjustment in case of the discrepancy specification, installation location. The discrepancy of specifications and installation location of item description is the main cause of the change of construction difficulty. If construction difficulty will not change, the amount of one of both the original labor and the original mechanical will increase or both of them increase at the same time in the case of the same material. While construction difficulty changes, in the case of the same material, the amount of new labor and (or) the original mechanical will increase. The concrete situation is shown in figure 4.

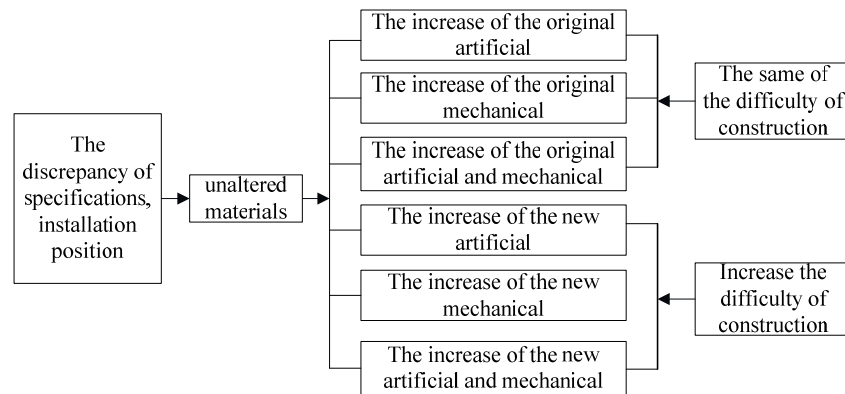


Fig. 4 The analysis of the determination of all-in unit rate in the case of the discrepancy of engineering structure

When construction difficulty does not change, the original labor and mechanical can meet the construction of professional technical need and its usage amount may increase. In this case, the new all-in unit rate can be determined, according to the change valuation principles for the no specified but having similar of 13 list and then comparative analysis can be use to determine the all-in unit rate, according to similar projects.

When construction difficulty changes, it lead to not only the increase of the original labor and mechanical but also the change of the kinds of labor , mechanical and management risk costs. In this case, the new all-in unit rate can be determined, according to the change valuation principles for the no specified and similar of 13 list. Namely, the contractor should determining all-in unit rate in accordance with change engineering data, measurement rules and valuation methods, information price released by project cost management agency and contractor's offering floating rate. If information price is missing, contractors should use market price of having legitimate basis instead of information price.

Conclusion

During the construction process, contract price adjustment caused by discrepancies project characteristics is a focus of the contract dispute. Specific performance fuzzy of project characteristics discrepancy make all-in unit rate determining extremely difficult. This paper is based on the background of the principle of price adjustment for the discrepancies of project characteristics of 13 list, analyzing three specific aspects causing of discrepancies of project characteristics. It gives new ideas of the determination of new all-in unit rate in these three cases. In this study, the value of the price adjustment is more specific and it can reduce the dispute. It is beneficial to improve the efficiency of the price adjustment of contracting parties.

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