

# THE PRELIMINARY INVESTIGATION OF CURRENT CONSTRUCTION PAYMENT PRACTICES IN THE UK CONSTRUCTION PROJECTS

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## Abstract

Current payment methods have many faults which are detrimental to the formation and completion of a project. This includes the use of unfair payment terms, pricing strategies and payment mechanisms between the contracting parties. This resulted in being criticised and remain in doubt, the use of current payment methods to reward good contractors and to distinguish poorly performed construction firms. In order to have an insight into this issue, a structured survey was conducted amongst UK construction practitioners. It was found that traditional pricing methods (i.e. lump sum and unit price), payment methods (i.e. interim valuation) and retention still dominate current practice. The empirical findings show that there are significant differences in the use of pricing and payment methods (when making and receiving payments) in construction. Significant differences also found in the factors affecting the choice of pricing methods when making (and receiving) construction payments. The paper concludes with analysis of the findings and future direction of research in payment systems is also provided.

**Keywords:** Alternative payment systems, cash flow, pricing, payment methods, payment terms

## 1. Introduction

Currently there are a considerable number of pricing and payment methods available in the UK construction industry. These include the price-based pricing (i.e. lump sum), quantitative or rate-based pricing (i.e. unit price), and cost-based pricing methods (i.e. cost-reimbursable and cost target). Each practice has its unique purpose in terms of allocating levels of risk and responsibilities between the contracting parties [1]. This is due to the high level of risks in the management and financial aspect of a construction project. The Institution of Chemical Engineers (IChemE) has published a series of millennium edition standard forms of contract for civil engineering works. This includes guidance for various pricing and payment methods such as lump sum, cost reimbursable and target cost [2,3,4]. The JCT 98 Standard Form of Building Contract has taken the opportunity to amend its payment procedures following the UK Government Housing Grants, Construction and Regenerating Act 1996 (Part II) introduced a series of new requirements related to

construction payment. The Engineering Construction Contract 1995 (2nd edition) outlines six main options of pricing and contracts for engineering and construction works i.e. Option A - priced contract with activity schedule; Option B - priced contract with bill of quantities; Option C - target contract with activity schedule; Option D - target contract with bill of quantities; Option E - Cost reimbursable contract; and Option F - Management contract. Such wide spread use of different payment practices has proved the impractical in practice where undesirable payment mechanisms and terms of payment still pervade the construction practitioners. This includes delay in payment, over measurement, pay-when-paid and contractual abuse (i.e. retention) are commonly found [5,6]. These practices are evidenced in the National Specialist Contractor Council survey [7]. Furthermore, current payment methods do not provide incentive to the contractors and suppliers to promote value for money for construction clients [8].

Alternative payment systems have been suggested to resolve conflict ridden payment practices [9,10]. Examples are open book, incentive-based contracts, and milestone/stage payment methods which can help to shape the cash flow on a project to the satisfaction of the client. One of the many factors influencing the success of any project is likely to be based on choosing an appropriate payment system. The choice of these alternative payment systems is influenced by many factors. This research investigates practitioners' views on project objectives that influence the choice of construction pricing methods for a given type of project and client. In this paper, the term 'pricing and payment methods' is regarded as how the building and construction works are priced and paid between the contracting parties under the JCT 98 Standard Forms of Building Contract (hereafter JCT 98) and the Engineering and Construction Contract (hereafter ECC) 1995. The JCT 98 and ECC 1995 have been selected because the former represents the most significant and widely used standard form contract and the latter has a high reputation in providing good project management for construction works in all sectors.

## **2. Pricing and Payment Methods**

The wide spread use of various pricing and payment methods implies that the need for the construction practitioners to adopt alternative and appropriate pricing and payment methods that can have positive impact on the delivery of a construction project, and ultimately, to achieved client's satisfaction. According to Ashworth [11], building and civil engineering contractors are paid for the work they carry out on the two main methods i.e. measurement and cost reimbursement. Such payments to consultant and contractor are made against pre-agreed criteria in the measurement method and the actual costs involved will be paid under a cost reimbursement pricing method. The following discussion will focus on five different pricing approaches and four types of payment methods currently used in the UK construction industry.

In the **lump sum** (LS) pricing method, a contractor is required to submit one lump sum for the entire construction cost. The contractor is responsible for the satisfactory completion of the work for the stipulated amount, regardless the actual cost (over or under run) of the project [1]. In other words, the contractor takes responsibilities of the entire financial risks despite the total cost of the work exceeding the contract price. This includes cost escalation and currency fluctuations and any unforeseen costs from the works. This pricing method is commonly adopted when total cost is known in advance and urgent construction works are required [12,13]. According to Masterman [1], LS pricing method has the advantages of

reduced costs of design and construction administration which are related to quantity calculation, verification and measurements. It requires the contractor to propose a total current price based on plan, specification and the tender documents and all works specified in the drawing provided by the construction client.

The **unit price** (UP) method is one the widely used traditional pricing methods. The total construction cost is quoted based on a price per unit of measurement on estimated quantity of defined works [1]. Under this pricing method, client design's team is required to prepare detailed drawing and specifications for an invitation to tender. Traditionally, the successful contractor will be the lowest price tender, after time-value of money is considered. In other words, the benefit of this pricing method is to obtain competitive pricing between main contractors. Other advantages include a high degree of certainty on total cost and specified performance prior to the construction stage and therefore allow opportunities to combine best design and contracting skills [13].

The **cost reimbursable** pricing provides greater client's flexibility and eliminate a large number of risks in construction project [13]. The contractor is paid for a fee of the direct costs, overhead and profit based on the actual cost of the works. The common types of this pricing method are cost-plus fixed fee (CPF) and cost-plus incentive (CPI). The former is reimbursed all the costs incurred in the construction works plus a contractor's marked up profit; the latter includes incentive from cost savings and other contributions to improve the construction performance for the client, in addition to the cost and profit [14]. The advantages of this pricing method include sharing financial and practical risks of a project, and when the speed and early involvement of contractor is required [1].

The **fee as percentage of project value** (FPV) method is less popular compared to the aforementioned. According to Morledge et al. [15], a management contractor is paid by a FPV for managing a construction project by the client. The fee also covers contract administration, prime cost, and work contractors payments. The management contracting has direct contractual and working relationship with work contractors. The main advantages of a management contracting are time-saving potential and possible involvement of work contractors during the design of the project. Under JCT 98, the fees for a management contractor can be either a pre-agreed LS or a pre-agreed percentage of the contract cost plus total value. When working under the ECC the management contractor fee is based on a percentage of the actual project value plus the work contract sum.

### **3. Payment Methods and Payment Terms**

When and how to make payments between the contracting parties is crucial. Most traditional pricing methods use interim valuation for interval payment to the contractor. In UP, the payment method is based on actual quantities of each tender item completed each month. According to Clough and Sears [12], payment for the UP contract is based on the estimated quantities of certain well-defined items of work and costs per unit of work items agreed at the pre-tender stage. The total sum of money paid to the contractor for each work item is based on the actual units of work carried out and measured on site. Under JCT 98, there are contractual provisions for interim valuations, and percentage of the contract sum retained. This includes the maximum retention of 5% for a project (unless a different percentage is agreed by both parties). Retention has negative impact on contractor's cash

flow and has been widely criticised [5,6]. Under JCT 98, a retention is fiduciary (clause 30.5.1) and to be held as a trust fund in a separate account (clause 30.5.3) for the contractor and for any nominated subcontractor. However, a number of court cases have proved its impracticality in practice (see Wates and MacJordan court cases, in Knowles [16]). In contrast to JCT 98, other standard forms of contract, e.g. ICE 7th Editions, Government Public Procurement Form of Contract - GC/Wks/1 1998 and ECC have no contractual requirements for employer to hold retention in a separate account [16].

An interim valuation is an indispensable requirement in most of the standard forms of contract. Interim valuations of work incur the measurement on site, agreement and negotiation between the contracting parties based upon the value of work completed in the previous month [11,13]. Under most construction contracts i.e. JCT 98 (clause 30.2), ICE 6th and 7th Editions (clause 48), Government contract, GC/Wks/1 1998 condition 47, ECC (clause 50), certification and payment of the executed works between the contracting parties should be made on monthly basis. Each standard contract has their unique payment procedures. In GC/Wks/1 1998 for instance, milestone payment and the stage payment chart are required. Under JCT 98 (clause 30.1.1.1), an interim certificate is issued prior to the monthly interim payment for the contractor. Although the final date for each interim certificate payment is fourteen days. There is a number of issues to be considered before the interim payment is made to the contractor. Such as the responsibilities and agreements upon the valuation and certification of interim payment between the contracting parties, client's intention to issue notice to withhold (clauses 30.1.1.3 and 30.1.1.4), retention, deductions (clause 30.1.1.2) and subsequent adjustments to the interim payment. Further, interim payment could be also affected by valuation of variations, delay and disruption claims.

Under traditional interim valuation and certification methods, the payment mechanism is time consuming and therefore in recent years there has been a move to introduce 'periodic progress payment at monthly interval, which is the actual provisions in some standard forms of construction contract (e.g. construction schedule of conditions in ECC). This method is either 'progress' or 'stage' payment where a pre-agreed sum is paid only when work has reached a certain stage or milestone. This can be based on the predetermined percentages of each major component of work for monthly interval payment when the contractor's works achieve the target milestone [17]. This method can help to improve the contractor's cash flow since it is not committing their own resources to finance a project. Under ECC 1995 clause 31, a construction programme/schedule is required from the contractor. This construction programme is an important do

to date is the amount of actual cost which the contractor has accepted for payment plus the fee. The distinctions between the options of the ECC for payments are the methods how the contractor is paid/reimbursed and encouraged to be cost effective and so achieve savings. Ultimately, it creates an equitable balance of risk between the contracting parties.

#### **4. Project Objectives**

In this study, the selection of factors (i.e. project objectives- PO) affecting the choice of pricing methods is based on the literature and empirical findings of current research in payment practices [18,19]. In this research the PO are decision factors (i.e. fixed fee-CF, plus incentive-CPI, and fee as percentage of project value-FPV). Seventy six respondents returned the completed questionnaires making a total response rate of 30.4%. Of these, 76 respondents completed Part 1 and 51 respondents completed the second part of the questionnaire. Table 2 illustrates regional classification, turnover and types of organisation that responded to the questionnaire.

**Table 2: Respondents classification**

| Region           | No.       | %          | Turnover     | No.       | %          | Respondents type | No.       | %          |
|------------------|-----------|------------|--------------|-----------|------------|------------------|-----------|------------|
| England          | 44        | 57.9       | < £5 m       | 33        | 43.4       | Client           | 21        | 27.6       |
| Scotland         | 23        | 30.3       | £5 m - £50 m | 27        | 35.5       | Consultant       | 29        | 38.2       |
| Wales            | 6         | 7.9        | > £50 m      | 16        | 21.1       | Contractor       | 26        | 34.2       |
| Northern Ireland | 3         | 3.9        |              |           |            |                  |           |            |
| <b>Total</b>     | <b>76</b> | <b>100</b> |              | <b>76</b> | <b>100</b> |                  | <b>76</b> | <b>100</b> |

## 6. The Survey Findings

The ANOVA technique was used in both Parts 1 and 2 of this study. Analysis of Part 1 demonstrates that there was no significant difference of mean scores (i.e. pricing methods, payment methods, and payment terms) between the groups of respondents (i.e. public clients, consultants, contractors). Therefore, the following discussion interprets the results of the survey and focus on the combined perception of the respondents.

### 6.1 Part 1: Current Payment Practices

Table 3 shows the types of the pricing method that have been used during the past three years. Survey result demonstrates that LS is the most popular among the five pricing methods (i.e. 68%). This is followed by FPV (42%); UP (39%); CPF (18%); and CPI (9%). Table 4 shows the types of payment method that have been used during the past three years. Interim valuation is shown to be the most popular approach among the five payment methods where only 11% of the respondents indicate that they have never used this approach in the past three years. This is followed by stage payment (17%); milestone payment (37%); and advanced payment (76%).

**Table 3: The pricing methods have been used in the past three years**

|                      | LS   | UP   | CPF  | CPI  | FPV  |
|----------------------|------|------|------|------|------|
| <b>Never</b>         | 11%  | 26%  | 47%  | 63%  | 41%  |
| <b>At least once</b> | 21%  | 34%  | 34%  | 28%  | 17%  |
| <b>Very often</b>    | 68%  | 39%  | 18%  | 9%   | 42%  |
| <b>Total</b>         | 100% | 100% | 100% | 100% | 100% |

**Table 4: Types of payment method used by the respondents in the past three years**

|                      | Interim valuation | Stage payment | Milestone | Advanced |
|----------------------|-------------------|---------------|-----------|----------|
| <b>Never</b>         | 11%               | 17%           | 37%       | 76%      |
| <b>At least once</b> | 5%                | 33%           | 38%       | 21%      |
| <b>Very often</b>    | 84%               | 50%           | 25%       | 3%       |
| <b>Total</b>         | 100%              | 100%          | 100%      | 100%     |

Regarding the payment terms, Table 5 shows that retention is the most popular practice among other payment terms (i.e. 71%). This is followed by non-transparent method (49%); open book (43%); and without retention (32%).

**Table 5: Types of payment term**

|                      | Open Book | Non transparent | Retention | Without Retention |
|----------------------|-----------|-----------------|-----------|-------------------|
| <b>Never</b>         | 24%       | 35.5%           | 17%       | 34%               |
| <b>At least once</b> | 33%       | 15.8%           | 12%       | 34%               |
| <b>Very often</b>    | 43%       | 48.7%           | 71%       | 32%               |
| <b>Total</b>         | 100%      | 100%            | 100%      | 100%              |

Table 6 highlights the levels of satisfaction concerning different types of pricing method. More than half of the respondents (51%) claimed to be totally satisfied with UP method. This is followed by LS (36%); FPV (28%); and CPF (20%), and CPI (17%). This shows that majority of the respondents are satisfied with more “traditional pricing method”. There are 50% and 42% of the respondents, respectively, have ticked the “no comment and/or never used” box for the CPI and CPF methods.

**Table 6: Pricing methods Satisfaction**

|                              | LS    | UP    | CPF   | CPI   | FPV   |
|------------------------------|-------|-------|-------|-------|-------|
| <b>Dissatisfied</b>          | 6.6%  | 7.9%  | 3.9%  | 5.3%  | 3.9%  |
| <b>Just satisfied</b>        | 48.7% | 14.5% | 34.2% | 27.6% | 31.6% |
| <b>Total satisfied</b>       | 35.5% | 51.3% | 19.7% | 17.1% | 27.6% |
| <b>No comment/never used</b> | 9.2%  | 26.3% | 42.1% | 50.0% | 36.8% |
| <b>Total</b>                 | 100%  | 100%  | 100%  | 100%  | 100%  |

The findings in Table 7 show that 4% of the respondent dissatisfied with interim valuation. This is followed by stage payments (8%), advanced payment (11%) and milestone payment (12%). This indicates that most of the respondents preferred payment to be made using interim valuation rather than other methods. There were 50% of the respondents that have made “no comment and/or never used” advanced payment. This could be attributed to a number of reasons such as lack of confidence and awareness of the usefulness of this payment method.

**Table 7: Payment methods satisfaction**

|                              | Interim valuation | Stage payment | Milestone | Advanced |
|------------------------------|-------------------|---------------|-----------|----------|
| <b>Dissatisfied</b>          | 4%                | 8%            | 12%       | 11%      |
| <b>Just satisfied</b>        | 20%               | 38%           | 37%       | 3%       |
| <b>Total satisfied</b>       | 67%               | 36%           | 21%       | 37%      |
| <b>No comment/never used</b> | 9%                | 18%           | 30%       | 50%      |
| <b>Total</b>                 | 100%              | 100%          | 100%      | 100%     |

Findings from Table 5 show that 71% and 48% of the respondents frequently used retention and non-transparent payment terms respectively. With regards to the levels of satisfaction, Table 8 shows that 49% and 45% of the respondents were totally satisfied with contracts that did not apply retention and those that applied open book systems respectively.

**Table 8: Payment terms satisfaction**

|                              | Open Book | Non transparent | Retention | Without Retention |
|------------------------------|-----------|-----------------|-----------|-------------------|
| <b>Dissatisfied</b>          | 1.3%      | 9.1%            | 26.3%     | 10.5%             |
| <b>Just satisfied</b>        | 32.9%     | 38.2%           | 26.3%     | 19.7%             |
| <b>Total satisfied</b>       | 44.7%     | 27.6%           | 35.5%     | 48.7%             |
| <b>No comment/never used</b> | 21.1%     | 25.0%           | 11.8%     | 21.1%             |
| <b>Total</b>                 | 100%      | 100%            | 100%      | 100%              |

## 6.2 Part 2: Factors Influencing the Choice of Pricing Method

The findings in Part 2 show that most of the respondents used more than one pricing method when making and receiving construction payments. Traditional pricing methods

i.e. LS and UP were the most popular and widely used methods among the respondents in three different types of projects. The results show that there were 51 (100%) and 40 (78.4%) of the respondents who used LS and UP respectively. Among the other pricing methods: 31 (60.8%) of the respondents used CPF and CPI; and 32 (62.7%) respondents used FPV for three different types of project.

There are three sets of One-way ANOVA and post-hoc tests conducted in this study. The ANOVA was used to determine the significant difference of PO mean scores within the groups of project types, client characteristics, and pricing methods and the post-hoc test was used to identify where this difference occurs. In this study, the one-way ANOVA test confirmed that there was no significant difference in PO mean scores within the groups of project types and client characteristics. As a result, these PO were found equally important among three different types of project and client characteristics. However, in terms of the pricing methods used, the post-hoc test results show that seven out of fifteen mean scores were statistically different among five different types of pricing method. For instance, *cost certainty* was significantly different between LS, UP, CPF and CPI, where LS has the highest mean compared to UP, CPF and CPI. In other words, respondents' opinions were significantly different when *cost certainty* was compared across the LS, UP, CPF and CPI methods. This was due to the fact that *cost certainty* was viewed as being more important in LS than in UP, CPF and CPI. However, when considering the project objectives of *high level of prefabrication, opportunity for innovations, quality enhancement, support team work and time certainty* are the important PO for construction payment. It was found that CPI was the most popular approach among other pricing methods. When *transparency and openness* in payment system was considered as one of the important project objectives, UP, CPF and CPI were the most important pricing methods and were viewed as being significantly different and more important than LS.

## 7. Discussion

The payment systems adopted by the respondents in the past three years varied according to individual project objectives, size and types of projects. The empirical findings show that the majority of the survey's respondents adopted LS (68%) for pricing and used interim valuation (84%) and stage payment (50%) approaches for evaluating their monthly financial situation. 71% of the respondents also indicated that their monthly payments had made deductions against retention. This situation implies that construction payment practices remain in a traditional or conventional mode among the respondents to the survey. This maintenance of conventional practices is despite the repeated urges for change from the differing government and construction commentators [20,9,8,10].

The survey results show that most of the respondents were totally satisfied with UP (51%) and LS (36%) methods. However, the use of interim valuation (67%) was regarded as providing the most satisfied payment method. In regard to the levels of satisfaction on terms of payment, significant number of respondents were satisfied with open book (45%) and without retention (49%) compared to the use of other payment terms. This shows a conflicting view with the findings from Table 5. This could be because openness, transparency and trust have been viewed as being essential factors needed to establish a good working relationship between the contracting parties, even there are the 'unpopular' payment terms in use among the respondents. This also implies that although respondents (particularly consultants and contractors) are more aware of how the payment system



chosen is dictated by the contract in use and each interim payment is subjected to a deduction from a retention. The results show that respondents seem to be more satisfied with open book and without retention payment. This could be the reason that the respondents have little influence or the opportunity to explore alternative payment methods. This seems evident for the consultant and contractor respondents in particular. Perhaps, it could be that the decisions and preferences on payment terms and methods used on projects seem to depend on the construction client-in-charge or in favour of one contracting party. This obviously is another issue that needs further investigation.

Initially, the results in Part 2 of the analysis seemed to identify that the most important PO for a typical type of project and which was the most important client characteristic when choosing a most appropriate pricing method. However, the statistical analysis findings show that all the PO were equally important for different types of project and client. In terms of pricing, there were seven PO found to be significantly different across the five different pricing methods. These factors are, *cost certainty* which is the most important PO in LS; *high level of prefabrication, opportunity for innovations, quality enhancement, support teamwork* and *time certainty* are more important in CPI; and *transparency and openness* in payment system is the most important PO objective in UP, CPF and CPI. Such results indicate that respondents viewed the aforementioned PO differently when considering alternative pricing methods.

## 8. Future Works and Conclusion

The research identified the preferences of pricing method, payment method and payment terms in the current payment practices among the randomly selected UK construction practitioners. Although majority of the respondents have chosen traditional lump sum and unit price for pricing the construction works; interim valuation for monthly payment; and retention as the payment term in their past three years practices. Surprisingly, in terms of levels of satisfaction, respondents preferred to use without retention and use of open book rather than any other payment terms for construction payment. The findings show that traditional pricing methods continue to dominate the current practice. Cost-plus incentive is the most popular approach across five different types of pricing method when considering the factors of *high level of prefabrication, opportunity for innovations, quality enhancement, support team work* and *time certainty* for a construction project. The above findings are important for future research and the development of a multicriteria decision making tool in construction payments. The classification of important PO for different types of pricing method can be used to assist in the development of a construction payment decision making framework. The works can be further extended to develop a web-based decision making tool that could be incorporated into a payment system simulator for forecasting project cash flow.

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