REJUVENATING CONTRACT DOCUMENTATION - TO REFLECT REALISTIC RISK ALLOCATIONS

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Abstract

Recent research in Hong Kong confirmed that many construction claims and disputes can be traced back to ambiguities, omissions or non-specificities in long-used standard contract documents. Examples are cited of: (a) contradictions between clauses in 'Conditions of Contract' or between 'Specifications' and 'Bill of Quantities'; (b) failures to anticipate common problem scenarios and/or to allocate risks appropriately; (c) lack of clarity that leads to misinterpretations of responsibilities in handling potential risks.

Proposals are made to revise both standard and project-specific construction contract documentation on the basis of a databank of information on past and anticipated problems. Initial steps to establish such a databank are illustrated, based on an analysis of the significant sources and causes of claims and disputes in Hong Kong. A proposal to expand and update the databank relies on mobilising appropriate information technology techniques and tools to ensure its viability, given the difficulties of collecting and analysing adequate data from construction industry personnel who are usually both busy and reluctant to release sensitive information. Confidentiality protocols and other precautions need to be incorporated into the proposed system

The resulting structured approach to the formulation of contract documents for any construction contract is expected: (a) to help assign risks according to the more preached about but less practiced 'principle' of 'allocating risks to those best equipped to handle them'; and (b) to make explicit such risk allocation so that each party will take appropriate steps to price for, as well as to contain and control such risks, rather than to seek reasons to avoid responsibility in retrospect ie. 'after the event'.

Introduction

Procurement of construction products - ranging from a simple house to complex civil engineering works - requires appropriate contract documentation. However, various aspects of the required construction processes have evolved over time. Furthermore, technological advances in construction methods and materials have also resulted in improved procurement strategies. Such developments have usually contributed to complex contract documentation to communicate the intentions of the parties entering into an agreement to procure/ deliver a project. The risks associated with the various construction procurement processes are apportioned between the contracting parties in a manner that is supposed to be made explicit in the General Conditions of Contract.

The nature of civil engineering works invariably involves uncertainties and even unforeseen risks in design and construction. The Employers (Clients)/ Developers provide contingencies in contract sums to deal with such uncertain and unforeseen circumstances. However, the increasing proportion of project expenses needed to meet such contingencies often lead the employers to dispute the contractor's claims for extra time or costs.

The Hong Kong Government procures most civil engineering infrastructure projects using the traditional remeasurement contract system. A research investigation was mooted to study the significant sources and causes of construction claims in such civil engineering projects in Hong Kong. Some of the identified causes leading to major sources of claims, suggested the formulation of strategies using information technology to minimise/ control the claims. This paper outlines

such strategies and methods that would contribute to minimise/ control construction claims in traditional construction contracts, by essentially identifying and clarifying more realistic risk allocation protocols.

Major Sources of Claims

A questionnaire survey carried out in Hong Kong among selected senior professionals from the construction industry in 1996, revealed that the following 'sources' (of claims) are relatively significant in terms of magnitudes and frequencies of construction claims, for extra time or money in construction projects:

- Variations
- Unclear documentation
- Inadequate documentation
- Different Perceptions in assessment of claims for extensions of time
- Measurement Related Issues
- Instructions not being given during construction
- Specifications
- Inadequate Site Investigations

The above eight 'sources' of claims were perceived to be more significant from among the 14 sources of claims that were listed in the questionnaire - based on previous surveys of the international literature and the Hong Kong industry. The 'sources' were defined as those areas from which the claims (and/or disputes) originate under the contract, while 'causes' of claims were defined as those that trigger the respective sources.

Major Causes of Claims

The causes associated with the above eight 'more significant' sources of claims are indicated below the corresponding sources in the following lists. The perceived significance of each of the above causes was derived from interviews with eleven 'experts'. A ranking system with Rank 1 being "very significant" and Rank 5 being "negligible" was used. The median values of the responses from the interviews, as to the significance of the causes were inserted (in brackets) next to the corresponding causes in the following listings.

SOURCE: Variations

Corresponding Causes: Change of design to suit site conditions. (1.00)

Interference of permanent works with utility lines. (1.00)

Employer's desire to incorporate latest changes in scope during construction. (1.63)

Contractor considers that the varied works were carried out under dissimilar conditions to those contemplated in the original works, while Engineer considers the conditions were similar. (1.63)

Lack of records supplied by the Contractor to substantiate claimed resources. (1.71)

Engineer / Contractor adversarial relationship. (3.08)

Contractor considers that the contract rates are too low and hence work should be valued at new rates. Engineer disagrees. (3.14)

SOURCE: Unclear documentation

Corresponding Causes: Inadequate time allowed for project documentation. (1.50)

Very late changes initiated by the Employer. (1.70)

Inadequate experience of Project Engineer(s) assigned to prepare documents. (1.75)

Incorrect choice of contract system. (2.63)

SOURCE: Inadequate documentation

Corresponding Causes: Incomplete design at the time of tender. (1.50)

Inconsistent information in drawings. (1.56)

Late changes initiated by the Employer, causing discrepancies in the documentation. (2.00)

Solutions to constraints (such as inadequate borrow materials) do not cover every eventuality. (2.50)

Lack of coordination between different design teams at pre-contract stage. (2.60)

Inadequate brief from the Employer. (3.20)

SOURCE: Different perceptions in assessment of claims for extension of time

Corresponding Causes: Effect on critical activities. (1.50)

Criteria for determining date for substantial completion is unclear. (2.67)

Time of notification of claim - compared to when the event occurred etc. (3.10)

SOURCE: Measurement related issues

Corresponding Causes: Employer/Engineer's errors in quantities in tender. (1.33)

Items that were not itemised and measured. (1.67)

Discrepancy between standard method of measurement and particular preamble. (2.00)

Discrepancy between items measured in BOQ and standard method of measurement. (2.13)

Errors/ambiguities in description of items (2.20)

Inadequate item coverage in standard method of measurement. (2.50)

Disagreement on measurement lines. (2.63)

SOURCE: Instructions not being given during construction

Corresponding Causes: Engineer delays the issue of instruction when the Contractor requests for information / clarification. (1.70)

When two drawings show different dimensions, the Engineer issues instruction clarifying the details (ie providing correct information), but the Contractor considers that the instruction is a variation. (2.25)

Cases such as : eg. Drawings indicate that the manholes should be extended to revised road levels. No details for extension were shown on tender drawings- Contractor requests instruction under variation. {(a) Engineer requests Contractor's proposal (b) Engineer issues instruction (as clarification)}. (2.50)

SOURCE: Specifications

Corresponding Causes: Inadequately described method or performance specification. (1.83)

Use of documents prepared for previous contract and not specific to current Contract (1.88)

"OR EQUAL" specification.(2.38)

The specification leads to non-constructability (defective specification /tolerances). (2.44)

Use of untried/ unfamiliar products. (2.58)

Ambiguities - "phrasing"/ "typographical error". (2.75)

SOURCE: Inadequate Site Investigations

Corresponding Causes: Employers do not allocate sufficient budget for site investigation. (1.75)

Contractor's risk in respect of unforeseen ground conditions is significantly reduced with the increase in available information from site investigation. (1.75)

Inconsistent interpretation of site investigation reports by the Contractor and Engineer. (2.50)

It appears from the foregoing listings that many claims can be traced to (a) contradictions/ ambiguities between clauses in different contract documents; (b) failures to anticipate common

problem scenarios and/or to allocate risks appropriately; (c) lack of clarity that leads to misinterpretations of responsibilities in handling potential risks.

Risk Allocation

General Conditions of Contract clauses principally identify how the risks inherent in construction are apportioned between two parties to the contract - namely the Employer (Client) and the Contractor. The general principle in contract law is that commercial parties may make, within very broad parameters, whatever agreement they wish (O'Reilly, 1995). While contractors usually assume a multitude of risks, it is suggested that an equitable apportionment of risks can get the job done for less money and diminish the likelihood of claims and litigation. Many employers on the other hand view the harsh contract as consummate protection (O'Reilly, 1995). Duncan Wallace (1986) reduced risk allocation to a purely policy issue, as follows:

> 'assumption of an additional risk by the contractor, however unreasonable this may be said to be in moral terms, must inevitably be reflected in his price. Any discussion whether or not a particular risk should be so included in the price is in essence a question of policy, and not fairness, morality or justice. The desirability of the policy, may well vary with different type of projects'.

For example; the HKGCC (Hong Kong Government Conditions of Contract) assigns the risk in respect of unforeseen ground conditions to the contractor. The construction risks could possibly be assessed by the contractor while the design risks cannot be sustained by the contractor in a traditional remeasurement contract. It is not uncommon for design changes to be required due to unforeseen ground conditions. Contractors often query the suitability of design (for example, in the design of foundation) after exposing the unforeseen underground conditions. Contractors have largely (in most cases) learned to live with this risk allocation policy in Hong Kong.

But it is commonly held that the party who is in a better position to control a particular risk, should be allocated that risk (Kumaraswamy 1997b). Disproportionate or unsustainable risks carried by one party would also represent risks to the other. This is best illustrated by the case where a contract for construction of a deep sewage tunnel in Hong Kong has been recently terminated followed by ensuing legal threats and the suspension of an important section of a critical project. Time for completion is another common but contentious risk to be apportioned between the Contractor and the Employer. The significance of 'date for completion' is reviewed as another example in the following section.

Practical or Substantial completion

The time between the date of commencement and the date for practical completion is the time taken to complete the 'works'. When the 'works' are substantially complete the Engineer issues a certificate of practical completion. Practical or substantial completion is an important project milestone that triggers the following:

- release of retention
- Employer's right to possess the area/ to use the facility
- Employer's right to levy the liquidated damages
- Nullification of Employer's right to terminate the contract
- Employer's responsibility to take over the facility
- Statute limitations eg. Period for defective construction commences

In general, practical completion occurs when the works are ready for occupation in all ways relevant to the contract and are free from known omissions or defects (subject to the Latin maxim *de minimis non curat lex*, ie. that the law is not concerned with trivial matters). The intentions of the contracting parties at the time of agreement are particularly relevant. Changing circumstances during construction may determine the scope of works that should be complete for the purpose of

practical completion. The contractor is in a quandary if the circumstances continue to change to the extent that he will be unable to complete all the works at the same time. The Contractors may then plan the works based on the intent of the contract so that principal areas will be ready for occupation by the due date for completion and some less critical outstanding works may be completed during the defects liability period. This situation is common when the project is on a tight construction schedule. It is proposed that substantial completion be defined in terms of the purpose and the type of works that should be complete. The associated risks are normally specific to the project depending on the interfacing/ 'follow-on' projects.

It would thus be beneficial to the contractors as well as the Employers (Clients) if an unambiguous definition of substantial completion is provided in the documents. If the extent of the works that should be complete for the purpose of practical completion is less rigorous, this could perhaps lead to lower prices. For example the amount of 'outstanding works' could be defined in terms of a given value, in addition to defining the critical area of works and elements of works that should be necessarily complete for the purpose of practical completion.

If such a flexibility is not introduced, say by pre-identifying critical and non-critical 'sections' of the work, there may be situations where the Employer can not use completed areas. This is particularly so because 'substantial completion' is different from 'substantial performance'. In the latter case a party who is not even in full compliance with the entire terms of the contract may be entitled to recover the contract amount less the value of incomplete works, assuming that the latter are minor in nature and do not substantially affect the usage of the product.

Physical Impossibility

The contract provides that the contractor shall execute the works specified in the documents (including those instructed variations) save in so far as it is legally or physically impossible (eg. Clause 13 of the 6th Edition of the ICE Conditions of Contract). The state of the art in relation to the construction methods and performance of materials known at the time of executing the contract is increasingly becoming relevant. Contractors tend to defend the non-performance of contracts based on 'physical impossibility', as in two recent high profile examples in Hong Kong - in the previously mentioned deep sewage tunnel and also on a highway project. Absolute impossibility implies that the work is physically impossible or beyond the state of the art.

Impossibility can be either objective - eg. 'it cannot be done'; or subjective - eg. 'I cannot do it' (Thomas et al., 1995). Subjective impossibility cannot be a defence. However, 'commercially impractical' (ie. the work is physically possible, but only at great and disproportionate cost) may be used as a defence for repudiating a contract. Thus the 'Engineer' has a particular role to play at the time of tender - particularly if the Employer wishes to accept a very low tender - in clarifying /ensuring that the tenderer is aware of the risks involved in the project and has priced for them.

Application of Information Technology in Construction Projects

The growth of powerful personal computers in the past decade has accelerated the initiatives of the Hong Kong Government to increase the use of electronic software and hardware for document control in civil engineering projects. It was somewhat rare to see personal computers in a construction site in the early 1990's, although present in the consultants'/ contractors' head office environment. Affordable pricing of personal computers and associated peripherals have made it attractive to deploy computers with basic word processing and spreadsheet software on construction sites. Project planning software is also now being introduced into sites and linked with head offices as well as parallel/ interfacing projects.

For example, the Hong Kong Government has extensively used information technology in the Airport Core Programme (ACP) for document control, cost control and programming. The

research into construction claims in other (non-ACP) Government projects have prompted the authors to suggest ways of using information technology in improving the management of other civil engineering projects. Meanwhile, the Works Branch has itself recently introduced a computerised MIS (Management Information System) termed the PW_MS (Public Works Management System) which is designed to integrate information through a centralised data base (Futcher, 1997). This PW_MS is intended to process information from non-ACP projects handled by the Government departments under the Works Branch, such as Highways, Drainage Services, Civil Engineering and Water Supplies (Departments).

Records of Resources

Lack of accurate records has been one of the causes leading to claims from variations (and also to problems in the assessments of such claims). The responses from the experts indicated that it is a significant cause in terms of frequency and magnitude. It is usual for the contractor to submit records of labour and plant on a daily basis. However, this has been a difficult task to coordinate among different sections of the works and often the accuracy is inadequate to trace the actual work done. It is recommended to use a network of linked spread sheets to record the daily labour, plant and activity inputs and/or outputs.

Programming

The use of project management software (such as 'TimeLine' and "Primavera') in planning the works using a precedence diagramming method is becoming a common feature of civil engineering projects. However an integrated approach in cost control, resource records and programming is not common, perhaps because of the difficulties in obtaining appropriate computers/software commensurate with the size of the projects. The programme of works is dependent on the contractor's detailed method of construction and the levels of detail adopted in selection of activities and associated codes. For example, it is not useful to detail 'formwork', 'reinforcement' and 'concreting' separately for medium sized projects which will increase the number of activities and may test the limitation of the number of activities that the software can handle. The levels of detail in chosen activities should be selected taking account of the capability of software and the extent of control on progress that one wishes to exercise. These decisions have to be made at the outset of the project and are crucial for the efficient use of project management software. It is noted that some project management software have additional capabilities on cost/resources control. It is recommended that the use of compatible project management software (consultant/contractor) should be made mandatory, for obvious reasons of convenience and speed/ rapid response.

It is also recommended to link the records of resources with activity IDs (Identities) selected in the programme - this will assist the assessment of resource based valuations; and assessment of extensions of time due to excusable events.

Contract Documentation

Word processing software has been extensively used in standardising and preparing project specifications, while drawings are often prepared using software such as 'AutoCAD'. However, the occurrence of construction claims from 'unclear and inadequate documentation' continues. Significant causes of claims from 'documentation' are perceived to be 'inconsistent information in drawings', 'inadequate experience of the Project Engineer preparing contract documents' and 'Inadequate time allowed for project documentation'. Information technology is considered to be of assistance in reducing the effect of these causes that contribute to the claims. The use of computers in preparing the documents should shorten the preparation time of the documents while providing more time windows for checking the documents to reduce the inconsistencies. It would

certainly assist in reducing the errors in dimensions - a common error in drafting- if drawings are prepared using 'AutoCAD'. Notes in the drawings have to be checked systematically to avoid conflicts between drawings.

Even if appropriate software is used in producing the contract documents, ambiguities/ discrepancies may still be found in the contract documents since the concepts/clarity cannot be checked by the existing software capabilities. For example, experts perceived that the 'inexperience' of the 'Engineer' is one of the significant causes that result in inconsistent documentation. It is proposed that an Expert System should be developed to assist the engineers. Such a system could be linked to databases of past claims and/ or specific cases of time delay in settling the ambiguities/discrepancies and expert opinions applicable to different scenarios.

Contingency for Claims

It is usual to allow a contingency to cater for undefined risks in a project. It was found that the final contract sums have often exceeded the provision made at the outset of the project. The research into the occurrence of claims based on the categories permissible under the Hong Kong Government General Conditions of Contract (HKGCC) for civil engineering works revealed that the contingency can be reasonably accurately calculated using the frequencies and corresponding average 'paid amount/ Original Contract Value (OCV)'. In order to estimate the frequencies and the ratios (paid/OCV) reliable data should be collected from future projects in a structured format. It is suggested that a data base for claims management be centralised either under the Works Branch or appropriate departments. The data base may be structured according to the following:

- ◊ categories of claims with relevant codes [eg. previously established codes (Kumaraswamy, 1997a) based on permissible claims under HKGCC could be used - see Appendix 1]
- ◊ types of projects (eg. site formation; bridges; water supply)
- ◊ numbers of claims and amounts 'claimed' under each category
- ◊ numbers of claims and amounts 'paid' or extensions of time 'granted' under each category

The above task can be easily achieved through the use of a data base software with appropriate hardware.

Bill of Quantities

In the recent past there have been a number of purpose made programmes developed to prepare Bills of Quantities. However, such software is usually either too expensive for a medium size project or requires extensive training. Although these may contribute considerably, the affordability is often a critical issue. Standardisation, as in the building sector may be useful in making such software more affordable and also more reliable.

Document Control

Software such as "Soft Solutions" is used in recording 'incoming' and 'outgoing' correspondence in a project. Information technology provides various solutions for document controls - such as scanning the incoming documents; receiving documents in electronic format through electronic mail; data base management of all documents; easy search functions; easy storage. However, there are some unknowns or 'less known' areas associated with the electronic data base - such as security; size of the system (unclear at the outset due to lack of data); breakdown of the computer system paralysing the whole office. Economic solutions commensurate with commercial reality are needed in the context of the short term construction process. Data security/ confidentiality protocols and back-up systems need to be incorporated at an affordable cost.

Concluding Observations

The research investigation into the common causative patterns of construction claims has highlighted the areas where information technology could be particularly useful in re-engineering the contract documentation in construction projects. The Hong Kong Government has made inroads into the use of information technology particularly in the Airport Core Programme and to a certain extent in the Public Works Management programme. It is suggested that the following areas will need more extensive applications of information technology in the future: formulation/ adaptation/ assembly of appropriate contract documentation, document control, maintenance of records of labour and plant, programming (including progress monitoring) and claims management. Emphasis on the use of information technology in construction processes is increasing and a shift from manual to electronic communication/ management systems is inevitable. It is also recommended that professionals be prepared for these impending changes through structured training programmes.

Investigations into the optimum configuration of computer systems to carry out the set tasks such as document control, maintenance of records and claims management, will be useful in optimising the commercial balance between the costs and benefits of the increased use of IT in construction processes. It is also suggested that while costs may appear to be higher in the short term, the development of data bases and an 'expert system' front-end for example, would reap considerable benefits in the longer term. Typical patterns of risk allocation in contract documents will for example, be compared with common sources and causes of claims; and re-allocation and/or clarifications will be considered in particularly vulnerable areas for new contracts.

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Appendix 1 - Categories of cost and time claims under HKGCC

Cost Claims

CC1 Ambiguity in documents
CC2 Construction method change due to Engineer's comments
CC6 Facilities provided to other Contractors, in excess of those anticipated at tender stage
CC7 Additional tests
CC8 Uncovering of works for examination
CC9 Delayed possession of site
CC10 Acceleration of works
CC11 Suspension of works
CC12 Additional works arising from repairs/ defects
CC14 Interest on claims due to late valuation
CC15 Disruption to regular progress
CC16 Employer's breach of contract
CC17 Variation
CC18 Others

Time Claims

TC1 Inclement Weather
TC2 Hoisting of Storm Signal No. 8 or above
TC3 Instruction Issued to resolve discrepancy
TC4 Variation Order
TC5 Substantial increase in quantity of any work item not resulting from variation
TC6 Delayed possession of site
TC7 Disruption of regular progress
TC8 Suspension by the Engineer
TC9 Delay caused by an utility service organisation
TC11 Any other special circumstance