Role, definition and dimensions of incomplete construction contract documents

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Abstract:
The extent to which documentation incompleteness affects construction is well-recorded in a plethora of anecdotes and data detailing inefficiencies generated by letting contracts based on minimum information (Hughes and Barber, 1992). The inability to list entire contingency ranges, reduced design fee levels, and limited time for document development, all produce documents lacking exhaustive descriptions of parties’ rights and obligations for every contingency (Murray and Langford, 2003; Andi and Minato, 2003; Murdoch and Hughes, 2008). Nevertheless, many parties intentionally produce documents wherein production information, contingencies, obligations, and future duties are intentionally left unspecified, to achieve efficient organization of exchange and minimize transaction governance costs (Crocker and Reynolds, 1993; Al-Najjar, 1995; Saussier, 2000). Researchers call attention to theory focusing on the feasibility of completely describing contingencies and sensitivities to all contract-period events, with limited emphasis on the role of documentation incompleteness (Al-Najjar, 1995).

This study, informed by Al-Najjar’s (1995) approach to investigating this incompleteness function, addresses this shortcoming. The approach requires that contractual relations governance be conceptualized as: combining instruments to minimize costs by evaluating transaction attributes. This conceptualization guides the questions to be asked about incomplete documentation. It is suggested that researchers should be concerned with reasons for incompleteness. Of particular interest here is: defining degrees of document incompleteness and understanding influencing factors. Also, are there situations when parties might choose incomplete documents over more easily produced detailed documentation?

The TCE framework is considered best for systematically exploring issues surrounding construction contract incompleteness and answering these questions. Accessing a contract database, to review relationships between a regular building promoter and its builders, should allow greater understanding of variability in documentation incompleteness for the chosen project type. These results should supplement limited theoretical guidance on the role of incompleteness and contribute to developing consistent measures for construction documentation incompleteness and its impacts.

Keywords: contractual governance, documentation incompleteness, transaction costs
1 Introduction

Many have observed that even when produced by the same design/construction teams, working under seemingly similar circumstances, documentation incompleteness levels vary from project to project. Similarly and concomittantly, there are varying results for efficient project execution. In fact, the Tavistock (1996) and Yates and Hardcastle (2003) research agendas provide support for the notion that an optimal level of documentation completeness for every project is an enduring construction industry concern.

The authors are of the view that if construction project contributors, and in particular, clients, develop sound understanding of factors influencing contractual incompleteness, they can be better guided in contractual choices. Theorists (Al-Najjar, 1995; Crocker and Reynolds, 1993; Saussier, 2000) and practitioners have sought to understand contractual choices and explain variability. Unfortunately, however, only few studies empirically analyze contractual documents generated in inter-firm relationships. Even fewer address contract completeness levels chosen by contracting parties. Saussier (2000) identifies main contributions as being made by Crocker and Masten (1991) and Crocker and Reynolds (1993). Although they illustrate the methodological shift from the incomplete contracts theory (ICT) framework to the transaction cost economics (TCE) framework for analysis of contractual incompleteness, they do not elaborate on practical processes for defining contractual completeness and its dimensions. Revealed from reviewing the construction literature is the confounding lack of consensus on the importance of documentation-related construction process inefficiencies. Some (Kumaraswamy, 1997b; Yates and Hardcastle, 2003; Yogeswaran, Kumaraswamy, and Miller, 1997) cite incomplete documentation as a root cause for construction process inefficiencies, while others (Diekmann and Girard, 1995) view documentation impacts as symptomatic of other behavioural, process, and environmental root factors. Moreover, although Yates and Hardcastle (2003) advise proactive reduction of contractual incompleteness to improve efficiencies, they stop short of outlining procedures to achieve it.

Here, the assumption is: documentation incompleteness is a significant factor in achieving construction project efficiency and understanding the rationale for incomplete documentation should shed light on contractual choice questions. Current research seems to be inhibited by the absence of a comprehensive research model or framework to enable holistic exploration of contractual incompleteness. With this paper, we would like to contribute by proposing a practical approach to explore contractual incompleteness. The theoretical framework for this study is informed by the construction, law and economics, sociological and business literature and illustrated in construction terms.

This paper proceeds by outlining developments in ICT and TCE. We then describe the construction contract data acquisition, methodology for development of the incompleteness measure, and explain potential results. We conclude by discussing the implications of expected results and providing suggestions for future research.
2 Why Are Contracts Incomplete?

Construction contracts are generally assumed to be incomplete. They are vague or silent on a number of key features – notably, all contingencies that determine desirable choices and how decisions are made in response to contingencies. A case in point is: structuring economic institutions within the construction industry. Firms can be defined as nexuses of contracts (Reeve, 1990). Applying Williamson’s (1986) logic, the construction industry can be viewed as a network of contracts (Pugh and Hickson, 2007). Institutions are set up with loose objectives such as: ‘to deliver improved industry performance resulting in a demonstrably better built environment’ (Constructing Excellence (CE)); or ‘to make a measurable difference to the value, cost and time of clients’ projects and to provide services that combine to produce the best project and cost management in the industry’ (Davis Langdon)).

Before proceeding with contractual choice explorations, it would be helpful to introduce some ICT terminology, as ICT seems to be the most commonly invoked framework for analysis of problems in law and social sciences - probably because ICT is perceived to underlie some of the most important issues in these fields (Tirole, 1999). Also, reviewing the ICT genealogy would be instructive.

Now, Krugman and Wells (2009) describe economics as: involving creation of models that draw on basic principles, with added assumptions, that allow modellers to apply those principles to particular situations. Models are simplified representations of real-life situations, designed to illustrate more complex processes. Positive economic analysis uses models to answer questions about how the world works; while normative analysis uses models to explain how the world should work. In contracting theory, models are used to describe bargaining processes between agents in well-defined economic institutional settings (e.g. uncertainty, information asymmetry, commitment and renegotiation), using the Principal-Agent model (P-Am), which is an information asymmetry problem (an informed party meets an uninformed party (Salanié, 2005)). The P-Am, generates two other problems – adverse selection and moral hazard. Winch (2002) outlines these two problems in construction terms:

**Adverse Selection** - How can clients be sure that the most enthusiastic offer of required resources is not the most desperate; that the lowest price is offered because nobody else will contract with suppliers based on knowledge of their real capabilities?

**Moral Hazard** - How can clients be sure that firms, once hired, will fully mobilize their capabilities on the clients’ behalf, rather than on their own behalf or for other clients?

In ICT, the complete contract is the benchmark for developing models to illustrate and aid thinking on reasons for incomplete contracts (ICs) (Saussier, 2000). Usually two types of complete contracts are distinguished - contingent-claims contracts (CCCs) and complete/comprehensive contracts (CCs). CCCs are contingent on all variables relevant to contract fulfilment. All states of nature are observable and verifiable (able to be observed by transaction outsiders (e.g. contract enforcement authorities and courts)), leaving no possibility for adverse selection or moral hazard. CCCs were originally conceived to model general equilibrium – not as contracting models. This drastic simplification of contracting problems is a highly unrealistic depiction of real-world contracts. In reality, there are contract-drafting costs, limits on contract enforcement, and parties cannot instantly determine complex optimal long-term contracts (Bolton and Dewatripont, 2005). It is useless to condition contracts on variable values that cannot be settled in dispute. Even without negotiating and contract-writing costs, and without legal system constraints, *bounded rationality* (BR) (parties not
knowing precise conditions under which contracts will be executed (Winch, 2002)) forces parties to neglect some variables whose effect on relationships is difficult to evaluate. Thus far, economics research has made little progress in modelling BR (Salanié, 2005).

Therefore, ICT models were developed and used to account for certain standard economic institutions that CCCs could not. CCCs are not feasible with private information, but CCs are. For reasons outlined previously, CCs typically account for limited numbers of variables that are believed to be most relevant; or those verifiable by courts. CCs take into account all relevant information and are contingent on verifiable variables, enabling each party’s obligations to be specified in all conceivable eventualities. Using CCCs as the benchmark, therefore, ICs are contracts that do not even take all relevant variables into account.

Primarily, organizational issues motivated ICT modelling, e.g. what determines the size of the firm; or how authority is distributed within firms? Due to conceptualization and modelling difficulties in normative analysis of organizational issues, however, most organizations are not set up as contracts specifying how decisions follow from eliciting information about economies and societies. They do not deal explicitly with all possible contingencies and, instead, leave many decisions and transactions to be determined later (Tirole, 1999). ICT became a vehicle for analysing economic institutions and organizations, using models that consider economic situations (Bolton and Dewatripont, 2005). At this stage of ICT development, ICs are assumed to be prespecified, and control variables (range of instruments for governing transactions) include: ownership titles, control rights, decision-making rules, discretion, tasks, authority, and social conventions defining acceptable behaviour, to be allocated among parties.

Under ICT, parties sign incomplete contracts because they would like to add contingent clauses, but are unable to because states cannot be verified or because they are too expensive to describe ex ante (Hart, 1995). Because of BR, contracting parties must determine some transactions and decisions later.

3 Transaction Cost Economics and Role of Incomplete Contracts

3.1 Methodological Shift for Incomplete Contractual Analysis

Theorists seem generally satisfied with the ability of ICT to explain motivations for and impacts of ICs. However, they specifically question the validity of ICT framework models to formalize problems of: differences between contractual completeness levels and the extent to which those levels result from parties’ goodwill. For an explanation of the rationale behind contractual choice, we review Saussier’s (2000) criticisms of theorists’ efforts to model problems within the ICT framework. Usually, ICT explanations for parties’ motivations to sign ICs related to BR and verifiability of contract fulfilment variables. In this paradigm, models generally make the following simplifying assumptions:

- information symmetry exists between contracting parties;
- contractual incompleteness is due to external constraints;
- incompleteness is assumed as a basis for reasoning, rather than actually explained.
The concern is that these assumptions are not entirely satisfied in practice and, the difficult to formalize, BR concept is excluded from ICT analysis. Some theorists, therefore, turned to TCE for analysis of contractual choice. In TCE, contractual incompleteness is represented as an endogenous tradeoff between parties aiming to save transaction governance costs.

According to Crocker and Reynolds (1993), were contracting costless, in principle, it would be possible to design arrangements complete enough to circumscribe all surplus-eroding, redistributive tactics and intricate enough to mitigate investment distortions. In practice, however, costs of identifying contingencies and devising responses increases rapidly in complex or uncertain environments (usually the situation with construction contracts), placing economic limits on agents’ abilities to draft and implement elaborate contractual agreements. When designing contracts, parties may mitigate ex post opportunism and investment distortions by using more complete agreements, but at the cost of increased resources dedicated to crafting documents a priori. Consequently, environmental characteristics that generate increased contracting costs should result in less complete contracts, whereas conditions that exacerbate the potential for ex post efficiencies should lead to more exhaustive arrangements.

In reality, negotiating construction projects is costly, engaging managers and lawyers. Therefore, at some point during negotiations, costs of contemplating specific arrangements to cover unlikely contingencies outweigh benefits. Also inability/unwillingness of courts and third parties to verify ex post values of certain observed variables is costly. Therefore, parties decide on a level of incompleteness. This TCE view of the role of ICs is represented diagrammatically in Figure 1.

![Figure 1](image-url)

**Figure 1** The Relationship between Degree of Contractual Completeness and Marginal Costs and Benefits of Contractual Completeness
(adapted from Crocker and Reynolds (1993))

where:

- $p$: probability that a contingency not expressly covered by the agreement may arise
- $\omega$: degree of environmental complexity
- $L$: likelihood of opportunistic (redistributive) behaviour/activities
- $MC$: marginal costs of contracting
- $MB$: marginal benefit of increased completeness
3.2 TCE Theory and The Role of Incompleteness in Contract Design

The limited empirical research on contract design has been heavily influenced by TCE. TCE contract design theory is premised on ideas about contractual functions that were first emphasized in legal literature. In particular, contracts are designed to facilitate transactions between parties, and this purpose is achieved to the extent that contracts:

- align parties’ expectations with regard to the other’s obligations under agreement
- provide incentives for parties to fulfill these obligations,
- prevent costly disputes from arising
- provide a basis for resolving disputes that arise despite best efforts, whether the disputes arise from opportunism or from honest misunderstandings.

Under TCE, where contractual incompleteness reflects attempts to achieve more efficient organization of exchange by minimizing transaction governance costs, the upper bound CCCs benchmark, is unattainable and parties do not always know optimal responses to foreseeable contingencies (Saussier, 2000). Opportunistic and boundedly rational agents make contracts incomplete. Also, since many investments in relationship-specific assets (having little value outside of the relationship at hand) are nonverifiable, parties execute ICs to avoid being expropriated of surpluses created by these specific investments.

Understanding ICs’ role can be built on the principle of combining governance instruments to minimize transaction costs by considering primitive transaction attributes. Governing complex transactions requires contracting parties to adapt performance to contingencies that actually arise. Availability of other instruments, (other than explicit ICs), suggests that some aspects of contractual performance will be governed by explicit contracts, while other instruments (e.g. implicit social conventions contracts) govern remaining aspects. To develop a picture of governance boundaries generated in contractual relationships, Al-Najjar (1995) suggests imagining them coinciding with the boundaries of each governance method, over the range of possible contingencies. These boundaries will vary across transactions to reflect differences in primitive attributes. Boundaries will also change over time in response to changing environments (e.g. market conditions, technological innovations).

ICT makes completeness levels difficult to evaluate, but TCE transforms the vital question from ‘Why do parties sign incomplete contracts?’ to ‘Why are contracts incomplete in the particular way observed?’ (Al-Najjar, 1995). For example, are gaps in performance specifications symmetrically distributed across contracting parties in given transactions; or are incomplete contracts lopsided - being more complete regarding obligations of one party relative to another? Of particular interest here, is whether there are conditions under which contracting parties might choose incomplete contracts even though more detailed contracts could have been easily drafted. This motivates the search for definition of the degree of contractual incompleteness of contracts and its influencing factors.

4 Definition of Incomplete Contracts

ICs have been defined as contracts that tend to specify every transaction dimension, but not necessarily all relevant information. Furlotti (2007) defines completeness as leaving ‘no possibility to improve efficiency by ex post adjustment of actions’. CCs can be achieved by
determining contingencies and prescribing corresponding joint surplus-maximizing actions. Applying this definition and relaxing CCCs assumptions enables a feasible upper bound to be determined through a measure that considers all incompleteness dimensions. Under this definition, CCs are contracts that utilize complex contractual governance apparatus, contingency planning and specify transaction performance in every conceivable case. Using this definition, a methodology can be devised to evaluate documentation completeness. This definition assumes there are alternative governance mechanisms and behaviour prescription.

5 Construction Contracts and Incompleteness Dimensional Analysis

Through endogenizing completeness under TCE, theorists realized the impossibility of achieving CCs through a single dimension. Before this realization, studies used differing operationalizations to represent endogenized completeness. The focus was on measuring degree of completeness through the various constructs. In order to truly evaluate degree of completeness, the dimensions must be explored in greater detail.

We consider prior research evidence that supports minimizing transaction costs through strategically incorporating contractual information based on exchange attributes. After a comprehensive literature review, Furlotti (2007) regrouped the range of operationalizations for endogenizing completeness under three conceptually-derived labels – specificity, complexity, and contingency planning. These dimensions were not clearly distinguished from each other, nor were they reconciled with the full range of contractual mechanisms observed. Also, Furlotti (2007) opined that a single completeness dimension cannot satisfactorily capture the extensive heterogeneity observed in contractual processes and mechanisms for various functions (e.g. enforcement, adaptation, etc.). Furthermore, researchers examined antecedents’ influences on contractual choice along different dimensions, without real consensus. Thus, the recommendation is to perform systematic, empirical investigations into all contractual completeness dimensions, to generate taxonomies based on those dimensions. As most empirical research on contract structure treats observed contract designs as equilibrium outcomes of competition (Argyres et al., 2007) without investigating completeness dimensions, scarce evidence exists, prompting calls for empirical work on contract documents (Brickley, 1999). Though much theoretical evidence exists in the economics and construction literature, outside economics, contractual studies are rare (Smith and King, 2007) with most empirical work ignoring completeness dimensions, in favour of its antecedents. Few studies advise on a comprehensive practical approach.

Studies reviewed by Furlotti (2007) uncover a variety of operationalizations, fields and contract forms. Results provide insight into corresponding construction contractual provisions. This study proposes a more comprehensive methodology for construction that contemplates entire documentation packages (i.e all production information (PI) and contract forms). The completeness attribute is important for construction because parties usually sign incomplete contracts in absence of objective criteria for determining degree of incompleteness. The completeness determination can be a difficult choice that parties struggle to make.

Now, as completeness determinations are expected to vary in accordance with metrics deployed (Malatesta, 2009), our aim is to develop a single comprehensive completeness
measure. Our approach combines a number of best practice recommendations for PI generation and contract formulation into one unique methodology for assessing construction contractual completeness. Also, this methodology is to be developed by analyzing an appropriate sample set of contract documents of a particular building type and therefore, should add content to the chosen construction industry subsector.

The construction industry is a fertile environment for observation of contract workings, because, at 10%, it is sixth-largest GDP contributor to the UK economy (Adamson and Pollington, 2006). So, with a broad range of subsectors and projects to choose from, evidence can be based on large samples. Also, predominantly project-based work makes sophisticated contracts an important feature of the business landscape. The contract will be the natural choice for unit of analysis. Clients determine need for projects and then engage a number of contractors to procure each project separately. This affords a rich data set to illustrate various dimensions, while maintaining necessary sample homogeneity. From contract documentation, completeness dimensions will be reviewed. The focus is on contract heterogeneity resulting from contractual incompleteness. Other heterogeneity sources will be controlled by limiting scope to similar projects e.g. in terms of size, value, a single owner, procurement route (traditional) and relationship type (owner-main contractor). Recommended for this study are the most widely used forms for major UK building work (JCT with Specifications and Drawings or with Quantities to SMM7) (Cox and Clamp, 2003; Sullivan, 2004).

Empirical information is limited since detailed contractual information is not usually released. Therefore, in addition to desk study of contract documents, those knowledgeable of contract formulation processes, such as lawyers, client and contractor executives and personnel will be consulted, through interviews, to obtain more detailed knowledge of project conditions; provide greater insight into contract formulation; and confirm and/or supplement literature findings. These individuals can also assist with dimension coding.

Dimensions can be classified as ex ante and ex post. From the Yates and Hardcastle (2003) completeness definitions, ex ante dimensions (ambiguity/specificity, complexity, and contingency planning) will be constructed from contract forms while ex post dimensions will largely be derived from the PI (drawings, specifications, and bills of quantities). Ex post dimensions, usually observable after contract execution, are manifested in phenomena such as: ambiguities, errors and omissions in ex ante documentation. Generally, ex post dimensions necessitate clarification of client/design team requirements and lead to variations.

### Methodology for Evaluating Incompleteness Dimensions

#### 6 Ex Ante Dimensions and Contract Forms

##### 6.1 Contractual Ambiguity/Specificity

Parties use ambiguity to increase contractual adaptability and flexibility, and thus, incompleteness. Ambiguous contracts broadly state requirements without restricting parties to specific actions (Al-Najjar, 1995). e.g. In fixed price construction contracts, specification ambiguity increases in order of: fixed design, scope design, cardinal points (Turner, 2004).
To investigate the ambiguity/specificity dimension (ASD), we look to economics and business research for guidance. As studies do not generally address ambiguity directly (Furlotti, 2007), we turn to those designed to investigate contractual specificity/detail, and thus conversely, completeness. We draw inspiration from the inductive Ryall and Sampson (2009) approach, which satisfies our comprehensively objective requirements.

To operationalize ASD, first, Ryall and Sampson (2009) conduct in-depth analyses of their sample contracts to determine forms taken by contractual terms. Next, they develop a descriptive overview that details the structure of sample contracts. Once a general understanding of all contract terms has been established, then the broad categories that account for the largest portion of variance across contracts can be determined. For JCT 98, the conditions (Cox and Clamp, 2003) cover multi-dimensional broad categories that can be summarized as follows:

1) Intentions
2) Time Frames for Task Completion
3) Control and Contract Administration
4) Money
5) Statutory Obligations
6) Insurance
7) Termination
8) Miscellaneous
9) Disputes
10) Bonding Information
11) EDI Provisions
12) Supplemental VAT Agreement

After becoming fully conversant with the format, language, and terminology of the contract set, some degree of consistency in types of terms used across contracts will be observable. The aim is to identify those broad categories that would account for the greatest proportion of variance across contracts. Next, from the most detailed form that a contract may take, the clauses within these categories will be enumerated. e.g. JCT 98 categories 2), 4), 8), and 11) may be deemed to account for the greatest proportion of variance. For the most detailed contract in the set, the clauses within 2), 4), 8), and 11) will be enumerated.

Frequency and cross-frequency tables presenting incidences of occurrence and co-occurrence of terms across contracts in the set will be developed. This structural presentation will provide the benchmark, and thus, upper bound for ASD. Then we can check each contract against this descriptive structure to determine how ‘fully specified’ are contracts in the set. Contractual content can be measured by examining the number of terms within each broad category of variance. Contract ASD can be constructed as an ordered variable, (0 to 6) based on the number of possible clauses in the contract, across all broad variance categories.

Considering evidence from sociology and economics (Argyres et al., 2007; Brickley, 1999; Crocker and Reynolds, 1993; Furlotti, 2007; Ryall and Sampson, 2009), the expectation is for less detailed contracts to be formulated in environments characterized by much uncertainty. Those contracts formulated by more experienced parties, or in the presence of heightened perceptions opportunistic behaviour would probably receive a higher ASD designation.
6.1.2 Complexity

Complexity dimension (CD) refers to the complexity of the contractual governance apparatus employed to inflict penalties for uncooperative or violative behaviours. Because of BR, parties implement contractual safeguards (stipulations in formal agreements), in conjunction with other relationship governance alternatives, to prevent information problems, motivation problems, and incomplete commitment problems. Usually, opportunism is inhibited by prospective punishment (Parkhe, 1993). Heightened perceptions of behavioural hazards would mobilize governance structures involving greater transaction costs (i.e. coordination efforts, compliance costs, including high outlays for drafting, negotiating, monitoring, and enforcement). According to Yates and Hardcastle (2003), construction contractual safeguards normally take one or more of three forms, namely:

- Appropriate incentives/disincentives, which usually involve some type of severance payment or penalty for premature termination;
- Procedures and mechanisms for efficient dispute resolution.
- Trading regularities to support and signal intentions for ongoing and future business relations.

Typical elements of construction contractual enforcement apparatuses are safeguards such as: rights to examine and audit all relevant loss-and-expense claims records through a CPA firm, arbitration and litigation, and premature termination provisions.

To compile a list of provisions making up the contractual enforcement apparatus for the contract set under study, relevant literature and JCT construction contract forms can be consulted and findings confirmed and/or supplemented by interviews with practitioners. Consensus will also be sought from practitioner-provided information. Parkhe (1993), Helm and Kloyer (2004), and Furlotti (2007) expect the intensity of these contractual safeguards to decrease with intended relationship duration, transaction size and strategic importance, behavioural and environmental uncertainty and generally, with the ease of observability of counterparties’ actions.

From the foregoing, one would expect that with the perception of increased contractual hazards, efficient/complete contracts would be more complex. Thus, more complex (complete) contracts are expected to utilize more stringent language, be longer, include more provisions, and provide for larger arrays of enforcement mechanisms. This reasoning inspires research on contract complexity (Furlotti, 2007).

For the contract set under study, number and stringency for the CD can be evaluated, using the Parkhe (1993) ‘contractual safeguards’ operationalization. This is an assessment of strength of explicit contractual opportunism deterrents. Parkhe (1993) examines contracts for the presence of provisions embodying the specific contractual enforcement apparatus for the type of agreement in question. Once identified in the contract set, with the help of practitioners, the provisions can be ranked in order of ‘increasing stringency’ to facilitate stringency score assignment. Next, these scores can be summarized into an ‘index of deterrents’ (IOD). For each contract, an IOD can be determined by arranging safeguards in order of increasing stringency and assigning each its corresponding value. e.g. the first-ranked safeguard would be assigned a value of 1, the third – 3, etc. The composite IOD would then be computed as $\sum$ (number of safeguard used/sum of number value of all safeguards used).
One would expect to see higher IOD values for large, important contracts with heightened perceptions of opportunistic proclivities.

6.1.3 Contingency Planning

For construction contracts, there are likely to be numerous important contingencies that parties may wish to anticipate and provide for in their contracts. The contingency planning (CP) dimension measures use of a particular strategy to achieve efficient adaptation (Furlotti, 2007). Including contingency plans in contracts is a key way of reducing contractual incompleteness (Argyres et al., 2007). According to Mayer and Bercovitz (2008), CP clauses specify actions to be taken by contracting parties in response to materialization of certain world states. These clauses facilitate adjustment within a well-defined range by providing a roadmap to follow if conditions change during contract execution. Clear codification of key events, to enable both parties to agree on occurrence, enables one or both parties to be required to take specific actions in response to certain events, to keep projects on track and feasible for all parties. Usually extent of CP is based on prior interaction between parties and characteristics of the current transaction. CP is favoured when there are greater ex ante conflicts of interest and lower contingency specification costs.

Mayer and Bercovitz (2008) outline benefits of CP to include: preservation of flexibility and reduction of opportunism risks. Flexibility facilitates adjustment when conditions change. Detailing contingency plans in contracts ensures that all parties have common assumptions and expectations, which should help facilitate adaptation. (e.g. If industry standards unexpectedly change, CP clauses can specify responsibility for bearing new standard compatibility costs). Also, CP lowers opportunism risks through clear specification, and thus, can constrain parties’ responses. Difficulty and cost of writing applicable clauses, however, complicates CP because additional resources (managerial time and firm capital) must be expended. Clearly, parties face a trade-off in deciding how much to invest in CP.

In construction contracts, parties often plan for changes in technology, input prices, government regulations, and product requirements. Though specific focus and wording of these clauses may vary, generally, they are either relatively generic, specifying processes or procedures to follow ‘in case something occurs’; or they can deal with possible occurrence of specific events. Examples of contingency clauses are: instructions for variations (general), change orders (general) and JCT 98 ‘relevant events’ (specific) clauses.

Probably, CP will be positively related to level of task interdependence, appropriability of proprietary technology, and prior relationships between parties, as repeat interactions allow partners to develop relationship-specific routines, so lowering costs and effort of explicit CP (Furlotti, 2007). CP will probably be negatively related to contingency specification costs.

The study contract set will contain detailed descriptions of projects, including type of service required, and parties’ responsibilities. Contracts can be graded on: ‘degree to which parties develop explicit response rules for specific classes of events’, using the Mayer and Bercovitz (2008) three-point CP scale:

- 0 if there is no CP for the project
- 1 if there is CP to accommodate ‘any’ kind of change
- 2 if there is more specific and detailed CP
CP is expected to increase with the level of task interdependence, appropriability of proprietary technology, and with working histories. Contracts executed in expensive contingency specification cost environments will probably receive lower CP ratings.

6.2 Ex Post Dimensions and Production Information

6.2.1 Production Information and Ambiguities, Errors, or Omissions

The Construction Project Information Committee (CPIC) (2009) defines PI as ‘information prepared by designers, which is passed on to construction teams to enable project to be constructed’. PI describes the nature and quality of work to be constructed, must be based on substantially complete design and is conveyed by drawings, specifications, bills of quantities (BQs), or schedules of work (for smaller projects). PI must be of good quality to be effective and for design to be satisfactorily realized. Poor PI causes delays, extra costs, and poor quality, which, in turn, give rise to disputes over responsibility for problems. Effective communication of complete, accurate, and coordinated PI is, therefore, of vital importance to construction project success (CPIC, 2009).

Construction project evidence (Andi and Minato, 2003; Tilley, McFallan, and Tucker, 1999) supports the notion that poor or missing PI causes many problems on site. NEDC (1987) also claims that improved PI quality reduces the incidence of site quality problems and leads to significant cost savings in construction work. Therefore, one would expect greater efficiencies to be realized on projects managed with more complete PI.

The recommended approach to measuring PI completeness is largely similar to that recommended for measuring ASD. The starting point would be to become fully conversant with formats, language, and terminology of the contract set PI. After accounting for the greatest proportion of variance, the expectation is for the greatest variability to be observed in the PC Sums, Provisional Sums and Quantities; and in documentation Ambiguities, Errors, or Omissions (AEO). These two categories will be dealt with separately. For the AEO category, the practical guidance offered by CPIC (2009) for overcoming PI deficiencies can be utilized to create checklists for review of PI documentation practice.

6.2.2 Bills of Quantities

Bills of Quantities (BQs) is a product-based cost model that measures finished work in place. BQs provide an agreed basis for categorizing and analyzing finished work – according to an industry-agreed convention: e.g. SMM7 (Kirkham, Greenhalgh and Waterman, 2007).

As many SMMs are in common use, we expect that all the BQs in the contract set will be prepared using rules in a specified SMM. Thus, minimal variability in application of SMM is expected and to arrive at a completeness rating, focus will be on actual BQs sums and quantities. The most complete BQs (i.e. the contract with BQs containing fewest PC Sums and Provisional Quantities and Sums) will serve as the upper bound for BQs for this type of project. The lower bound contract will be that containing the most PC Sums and Provisional Quantities and Sums. The BQs rating scale can then be calibrated to create a 5-point scale.
The completeness level for all other BQs from the other contracts within the set are expected to fall within these bounds and will be rated on a scale of 1-5, accordingly.

6.2.3  **Drawings**

A Drawings checklist will be prepared. The following are completeness considerations:
- Spatial and Technical Coordination
- Drawing Annotations – logical pattern of links between drawings
- Drawing Arrangement – inclusion of a Drawing Register
- Drawing Numbers and Titles – containing appropriate identification information
- Revised Drawings – revision descriptions and dates

6.2.4  **Specifications**

Production specification defines construction mainly in prescriptive terms, describing products to be used and important aspects of workmanship (CPIC, 2009).

The following are considerations for a checklist to evaluate Specifications completeness:
- Specific to the project, with no irrelevant material
- Comprehensive, covering every significant aspect of quality to a degree of detail appropriate to importance and nature of work
- Practicable, requirements being specified having regard to nature of the project and available knowledge and resources
- Constructive - helpfully specific so that all parties know what is expected.
- Technically correct and up-to-date, reflecting current good building practice and current statutory requirements
- Enforceable, requirements being specified only if compliance can be demonstrated economically and within an acceptable timescale.
- Well-coordinated, with no conflicts or ambiguities, either within itself, or with drawings and measured information.
- Developed throughout the project lifecycle to become an essential part of as-built information.

To determine AEO completeness, the checklists will be used to generate ratings for each contract document package in the set. If the contract document package under review specifies all listed items, then it will be given the maximum score. If documents do not specify any items, then the PI information in question will scored 0. For intermediate levels of AEO completeness, the number of checklisted items present in the package will be determined. Then, this number will be divided by the total number of items specified on all the AEO checklists in order to arrive at a completeness rating for the package under review.

6.3  **Overall Completeness Rating**

At this stage, all completeness ratings for all the contractual dimensions can be determined. Summing all the completeness dimension values:

\[(\text{ASD} + \text{CD} + \text{CP} + \text{BQs} + \text{AEO}),\]
will provide an overall score for contract documentation completeness that contemplates form of contract and PI. This methodology provides an objectively quantitative analytical procedure for determining contractual completeness.

7 Conclusion

The ICs theoretical framework development in the economics literature is summarized as follows. Original ICT approaches to conceptualizing contractual relations governance led to focus on why contracts are incomplete and incompleteness in and of itself. Typically, contractual incompleteness is explained by inability to describe certain events \textit{ex ante}, even if those events and their implications are easily recognized \textit{ex post}. The main issue for economic analysis is: how to structure contractual incompleteness. (i.e. incentives, organizations’ decision-making procedures, discretion versus rules, and accountability (Bolton and Dewatripont, 2005)). Contract formulations are rarely explained as optimization (choice of a level of incompleteness) problems. Under TCE, the substantive change is to shift focus away from procedural and institutional design to determining most efficient contracts for project governance. The change of assumptions inspired research that focused on measuring ‘degree of completeness’ and related concepts.

Awareness of economists’ use of models as satisfactory descriptive tools should guide economics literature navigation. Each model has its own logic and should be interpreted accordingly. Because economists base conclusions on models, variation in appropriate simplifications, and therefore, different conclusions are always possible. Usually, consensus develops with evidence accumulation, showing which models better fit facts. However, in economics, as in any science, it may be a long time before research settles important disputes. Since the world always changes, (making older models invalid or raising new questions and problems), there are always new issues on which economists disagree. Researchers must therefore, decide which framework to subscribe to.

Although the TCE theoretical framework does not yet allow complete problem formalization, it allows derivation of testable propositions (Crocker and Reynolds, 1993; Saussier, 2000). (e.g. Contractual incompleteness level is an endogenous choice for minimizing transaction costs.) By removing the assumption that parties have complete, unconstrained rationality, TCE imparted considerable thrust toward analyzing actual contracts (Williamson, 1975). Some (Parke, 1993; Smith and King, 2009) believe that empirical analysis will quicken consensus. Here, the authors believe that TCE offers the better vehicle to systematically explore issues surrounding construction contract incompleteness and answer the fundamentally important question of ‘How complete should contracts be?’

There are several other scientific benefits to a TCE analytical approach to construction contractual incompleteness. Most importantly, a standardized methodology for operationalizing documentation incompleteness, which can then be used as a documentation metric, is provided. The method reviews the entire documentation package, rather than just the contract form - the usual approach. Also, this methodology illustrates achievement of sample homogeneity to enable true comparison between contracts for the full breadth of the incompleteness variable.
Additionally, access to a rich dataset would provide greater understanding of a chosen industrial organization. There can be observation of details of how this organization manages contractual development activities to devise responses to challenging development issues, such as: dealing with opportunistic partners, contracting in complex and uncertain environments, and how complete to make the contract documents. Not only will there be better insight into antecedents of documentation design, but this research will enable observation of contractual role beyond the legal function of providing third party resolution. Contractual influences on project performance can be observed.

Given the sparse research base on building contracts formulation, we recommend that a model linking incompleteness and contract documentation be developed. New empirical findings on contract variation across incompleteness dimensions will add to a growing body of literature on detailed contractual analysis. Such a study should make several other contributions to construction contracting literature. It can be considered a response to the Ryall and Sampson (2009) call for more holistic approaches to be taken to examine contracts and contexts with a view to providing some empirical regularities for advancing theory development. Using this methodology should make a contribution to empirical contract research, where studies dealing with large sets of contractual provisions are still rare. For construction project management, empirical proof of an efficient level of contractual completeness should be compelling.

Finally, this type of investigation should add to the construction contract documentation literature by extending prior research on incompleteness and construction process inefficiencies (Yates and Hardcastle, 2003). Empirical support for associated hypotheses would have positive and normative implications, since it would suggest that later problems could be mitigated by ‘front end’ procedures. Access to actual contracts to permit detailed analysis is expected to be difficult and therefore, some form of sampling will have to be employed. This could distort results if sampling is not properly performed. Notwithstanding this limitation, we expect the results to provide provocative insight into considerations for the process of designing an instrument to measure documentation incompleteness. Literature reviews and subjective analysis is a good starting point, but with more formal empirical analysis, this kind of study will complement existing theory and suggest some promising directions for extension. Our analysis should provide a useful guideline for future studies to better understand parties’ abilities for effective coordination; and ultimately, quantify contractual incompleteness impacts for construction project management.
8 References


