

Is contractual risk a zero-sum game in construction contracts?

Dr Donald Charrett, Melbourne TEC Chambers
"The contract is the vehicle for risk allocation. Whether the contract is for construction, construction engineering and inspection, design, design-build, or some other aspect of highway construction management, it defines the roles and responsibilities for risks. Risk allocation in any contract affects cost, time, quality, and the potential for disputes, delays, and claims. In fact, contractual misallocation of risk has been found to be a leading cause of construction disputes in the United States."¹

In the shorthand question posed by the title of this paper, contractual risk comprehensively refers to the chance that the contractual objective will not be fulfilled. The question is then whether the form and/or terms of the contract can change (increase or decrease) the overall contract risk, or do they merely rearrange the deck chairs on the Titanic?

One view suggesting that contracts do not change overall contract risk has been expressed as follows: "The notion that risk is a fact of life, and that contracts cannot change facts of life, is therefore a powerful idea underpinning the T5 agreement."² Many contracts, particularly bespoke contracts, are based on the philosophy of transferring as much risk to the Contractor as possible without any consideration of whether that increases or decreases the overall contract risk.³ This paper endeavours to suggest answers to the question from a consideration of the nature and cause of the risks involved in construction contracts and the parties' objectives. It is suggested that contract risk can be minimised by selecting the appropriate form of contract as that which gives primacy to achievement of the Employer's most important objective(s). Further, for any type of contract, contract risk is minimised by following well-established principles of balanced risk allocation.

The contract and expectations

The following simplistic definition of a contract is adopted for the purposes of this paper: a contract is a legally binding agreement in which each party accepts **obligations** in exchange for **rights** granted by the other party in order to achieve the **contract objective**. It is suggested that one of the most important functions of a contract is to define the rights and obligations of the parties pursuant to the contract objective, in a legally binding form. Each of the key terms "obligations", "rights" and "contract objective" are discussed below in the context of construction contracts.

For example, in a conventional construct only contract the Contractor accepts the obligation to construct a facility of the specified quality in the

time provided for in the contract [plus a number of ancillary obligations related to the manner of performance], in exchange for the right to be paid by the Employer the amount(s) of money at the time(s) provided for in the contract. The Employer accepts the obligation to pay the Contractor the amount(s) of money at the time(s) provided for in the contract in exchange for the right to receive a facility of the specified quality at the time provided for in the contract.

As a consensual agreement in which each party voluntarily accepts obligations in exchange for rights in order to achieve something, a contract has an objective, and the contracting parties have expectations of their rights and obligations. Those expectations, to the extent that they are objectively based on the terms of the contract, are the **contractual expectations**. It is these expectations that are legally enforceable and sustain a claim for damages for breach of contract if they are not fulfilled. In the well-known formulation, damages are the amount of money that will put the non defaulting party in the position it would have been in if its contractual expectations had been fulfilled and the contract not breached.⁴

Looked at from a slightly different perspective, a contract could also be said to define the **scope** of each party's obligations and rights in pursuance of the contract objective. As usually applied in construction contracts, the overarching meaning of scope is the extent of the work. At a more detailed level however, the scope of each party's obligations and rights under a construction contract not only includes their extent, but also their characteristics. These characteristics can be conveniently summarised under the headings of time, cost, quality and often also the manner of performance, e.g. safely and legally.

There are potentially different scopes (or at least perceptions) of time, cost and quality associated with any contract:

- the expectations of the Employer;
- the expectations of the Contractor;
- the scope of what is achievable;
- the scope defined in the contract, ie the objective scope of time cost and quality which are legally enforceable; and
- the scope of what is actually delivered.

Any difference between the Employer's and Contractor's expectations of scope and the scope actually delivered will lead to unfulfilled expectations and potential dispute. Whether such a dispute can be successful will depend on the contractual scope, and the extent to which it coincides with the scope expectations. An incorrect perception of unfulfilled contract scope may not prevent a dispute, but it is unlikely to result in a satisfactory outcome. Ultimately, in any formal resolution of a dispute, the determinative factor is whether there is a difference between the scope of what was actually delivered (performance) and the scope defined in the contract (contractual expectations), not the subjective expectation of one of the parties. To the extent possible, a contract should

therefore align the Employer's and Contractor's subjective expectations with the contractual expectations.

The better the scope definition in the contract, the more likely it is that the Employer's and Contractor's expectations will be aligned with the contract scope, and the fewer the unknown risks there will be for both Employer and Contractor. Of course, it is possible that the scope of what is achievable does not coincide with the scope defined in the contract, but absent an appropriate contractual term modifying the common law obligations to achieve the contract objective, this will not relieve the relevant party (usually the Contractor) from the consequences of its breach of contract in not delivering the contractual scope.⁵

Objectives and expectations

The contract objective is achievement of the outcome that is the subject of the contract, the reason for its existence. In the case of a construction contract, this is construction of the relevant facility. In unusual situations a contract might explicitly state the contract objective.⁶ It can always be objectively determined by construction of the terms of the contract. In the absence of mutual abandonment by the parties, the contract objective must be achieved for the contract to be satisfactorily completed, and therefore for the parties' expectations to be fulfilled. If the contract objective is not achieved, a defaulting party may have a legal liability for "causing" the shortfall between the contract objective and the scope of what was achieved. The consequences of not achieving the contract objective in a construction contract can be very significant, as indicated by the following judicial statement on damages for defective work:

"Where the contract breaker has entirely failed to achieve the contract objective it may not be difficult to conclude that the loss is the necessary cost of achieving that objective. Thus if a building is constructed so defectively that it is of no use for its designed purpose the owner may have little difficulty in establishing that his loss is the necessary cost of reconstructing."⁷

Contractual success and failure

A useful definition of failure is "an unacceptable difference between expected and observed performance".⁸ Using the converse of this definition, it is suggested that an objectively successful contract is one in which the contractual expectations are fulfilled by the actual performance of the contractual obligations, and there are no issues arising between the contracting parties that have to be resolved judicially by an independent tribunal, external to the contracting parties. Thus disputes are a useful indicator of success and vice versa, and this is consistent with the industry focus on minimising or eliminating disputes.⁹

The definition of contractual expectations should theoretically be straightforward, since they can be determined by clear and unambiguous definition of the scope of the contract. Scope is about those things that the parties know about. These are the contract objective and the extent of obligations accepted by each party: the agreed quality, the time at which the contract objective is to be achieved and the cost and timing of payments. In addition there are likely to be constraints on the manner of performance of obligations, such as complying with all statutory

requirements, ensuring the health and safety of project participants and third parties, and protection of the environment.

Using Donald Rumsfeld's famous trichology of terms,¹⁰ a properly defined contractual scope will include all of the "known knowns", those things that the parties have knowledge of which will need to be addressed during performance of the contract. In addition, the contractual scope will normally also include provision for the "known unknowns", those things which the parties suspect may, but not necessarily will, impact on the performance of the contract. For obvious reasons, the contractual scope will not explicitly address the "unknown unknowns".

Risk

Risk is "the chance of something happening that will have an impact on objectives".¹¹ The "something happening" will be referred to in this paper as a risk event. Common usage of the term "risk" in relation to construction contracts is usually focused on adverse risks, ie those that have an adverse impact on attainment of the contract objective. However, it should be noted that the definition of risk above includes risk events that can either have an adverse or positive effect on the attainment of objectives. Risk relating to "known knowns" is essentially project execution risk, i.e. the chance that defined project obligations in respect of time, cost or quality will not be fulfilled. In a well written contract the consequences of the relevant identified risk events happening are usually adequately defined. Contracts frequently also make explicit provision for the obligations and rights arising from "known unknown" risks, since there is at least a suspicion that these may occur. A typical example of a "known unknown" risk event is latent ground conditions. Whilst the parties may have a suspicion that rock could be encountered during excavation for the foundations, it is not known if it will be, nor if it is, the extent or exact character of the rock. Nevertheless, the parties can define the obligations and rights of each of them in the event that rock is encountered. The unknown aspect of the latent conditions does not prevent appropriate definition of the scope of each party's relevant obligations and rights. Appropriate contractual provisions can be made for such latent conditions because they are foreseeable, even if the exact way and extent that they ultimately materialise is not actually foreseen. "Unknown unknowns" relate to unforeseen risks that the parties have neither knowledge nor suspicion of. The "unknown unknown" risk events are likely to be the most problematic if they happen, since the contract may not have made explicit provision for the rights and obligations arising. Each party may have different perceptions of the contractual consequences of such an event. An example of an "unknown unknown" risk event was the unacceptable vibration of the Millennium foot bridge over the Thames in London which occurred immediately on its opening in 2000. The very unusual phenomenon of lateral vibrations under pedestrian traffic was not anticipated by the designers, and accordingly no provision had been made in the original design to control it.¹²

Risks, being the chance of a risk event happening, either materialise or not. If a contractual risk event does not happen, neither party assumes

obligations nor gains rights in respect of the nonevent. If a contractual risk event does happen, contractual action will need to be taken because the event impacts on the attainment of the contract objective. Contractual action in this sense will involve the exercise of (additional) obligations to deal with the impact of the risk event to mitigate its effect on attainment of the contract objective. The additional obligations arising result in a concomitant accrual of the obverse rights by the other party.

The relationship between contract “success” and risk

It is a widely held view that disputes in construction contracts are inevitable. Anecdotal experience behind the formation of so many enquiries into disputes in the construction industry¹³ and the limited available statistics indicate a significant probability for the occurrence of a dispute in a construction contract.¹⁴ Clearly a dispute is not inevitable in any one contract, as many contracts of various types are successful. However, the chance or probability of success is less than one because, demonstrably, some contracts end up in dispute.

To answer the question posed by this paper rigorously, it would be necessary to have meaningful statistics of the probability of success for different types of contract, based on appropriate sample sizes. A specific form of contract which demonstrated greater “success” than the norm for all construction contracts would then indicate a higher probability of achieving the contract objective for that form of contract. The wide variety of different contractual approaches, different contract forms and the permutations and combinations resulting from individual contract clauses in different factual situations make this a formidable, if not impossible challenge.

It follows that the success of an individual project (indicated by no disputes) could result from any one or more of, *inter alia*:

- a chance outcome of probability because risks did not materialise;
- the form and/or terms of the contract which minimised contractual risk; or
- successful risk management during execution of the project ensured that no risks

materialised in a way that impacted the contract objective.

The latter two bullet points may well be interrelated, as the form and/or terms of the contract may encourage or promote successful risk management during the execution of the project itself. Because of the intervention of probabilities, the success or lack of it in an individual contract cannot prove or disprove whether contractual risk is reduced or increased. However, one useful assessment that can be made is whether the form/terms of a contract in the particular circumstances contain provisions that are generally regarded as reducing the likelihood of disputes.

“Allocation” of risk

Davenport has suggested that it is misleading to refer to contracts as “allocating” risk, as contracts allocate obligations.¹⁵ A risk, being the chance of an event happening, is not “allocated” to either party by the contract. It may exist separate and independent of the obligations

and rights of the parties, or the risk event may be under the “control” of one of the parties. To use the example of extreme weather conditions, neither party “controls” the risk in the sense of having any responsibility for the risk event happening, namely the occurrence of extreme weather conditions different from those expected by both parties. However, the risk that the equipment used will not be capable of constructing the facility is under the control of the Contractor who has the obligation to provide appropriate equipment to undertake the work.

Whether or not one of the parties has “control” over a risk event, it is the obligations and rights arising as a consequence of the risk event happening that is “allocated” by the contract. Thus, in respect of latent ground conditions, in addition to the Contractor’s obligation to carry out the additional work, the contract may give it the right to both an extension of time and additional compensation for the unforeseen additional work, whilst simultaneously placing an obligation on the Employer to grant an extension of time and pay the additional cost. The Abrahamson principles,¹⁶ well known to construction lawyers, are widely regarded as the basis of “balanced” or “fair” or “efficient” risk allocation. Many standard form contracts are based on the explicitly stated principle of balanced or fair risk allocation, e.g. the Australian Standard 4000 series,¹⁷ the US Consensusdocs,¹⁸ the UK New Engineering Contract,¹⁹ the European Engineering Industries Association,²⁰ the International Chamber of Commerce,²¹ the Baltic and International Marine Council²² and contracts for the UK offshore oil and gas industry.²³ The principle is also espoused by government procurement agencies in the UK,²⁴ Australia²⁵ and the USA.²⁶ Many writers suggest that adherence to the principle of balanced risk allocation enhances the prospect of successful contracts, by encouraging contractual performance that minimises adverse outcomes and thereby reduces disputation.²⁷

Risk management

Risk management is a widely used term which means different things to different people. Consistent with international standards, Australian Standard AS4360:2004 states that risk management is a holistic management process involving: identification, analysis, evaluation, treatment, communication and monitoring of risks. Treatment involves ways of dealing with identified risks in various ways in order to change them, and the term is synonymous with “control” in the Abrahamson sense. The term risk management is often used in the more restricted sense of risk treatment or control. Avoidance, abatement (minimisation) or transfer of a risk are specific methods of risk treatment.

The Abrahamson principles are predicated on the concept of which party “controls” a risk. A neutral risk is one which neither party “controls”. It is suggested that “control” by a party in respect of non neutral risks means that the party can influence at least one of:

- the likelihood of the risk event happening;
- the nature of the risk event; or
- the consequences if the risk event happens.

Scope and risk

As noted above, a contract defines the scope of each party's rights and obligations in pursuit of the contract objective. Each such obligation carries with it the risk of nonperformance and the obverse risk of the other party not receiving its corresponding right. Many clauses in construction contracts are terms that are designed to "encourage" performance of the contractual obligations, by use of either the "carrot" or the "stick". A bonus/penalty clause for early/late completion is an example of both approaches. Whatever method is adopted, the aim of such provisions is to reduce the risk of non-performance of contractual obligations. Of course, the ultimate stick is the legal sanction of damages for breach of contract to "encourage" performance of contractual obligations. It is perhaps stating the obvious to note that the better the definition of the scope of contractual obligations, the smaller the risk of non-performance of those obligations. The more "known knowns" there are, the fewer the "known unknowns" and "unknown unknowns", and the smaller the ambit of the risks. Ambiguity of contract terms is the antithesis of a clear definition of contract scope, since each party may have a different view of its rights and obligations arising from such terms. Such ambiguity must increase the risk of non-performance and the likelihood of subsequent disputes.

Risk events

True "unknown unknowns" form an important class of risks and risk events, as by definition they are not foreseeable, or at least were not foreseen by either contractual party. Contractually, the occurrence of an "unknown unknown" risk event can have the following consequences:

- (a) one party has a contractual liability arising from the happening of the risk event, because dealing with the event is within that party's contractual obligations;
- (b) the event is a force majeure event that triggers the relevant contractual provisions excusing performance; or
- (c) the contract is frustrated.

As an example of (a), in a contract with no force majeure or unforeseeable events clause, a severe earthquake in an area classified as not subject to significant earthquakes might cause collapse of a partly constructed structure, leaving the contractor with expensive reinstatement work to complete at its own cost (which event it may or may not have insured for).

The determination of which category an "unknown unknown" risk falls into depends on construction of the terms of the contract. The consequences of risk events (a) and (b) are determined in accordance with the provisions of the contract. A force majeure clause is a contractual mechanism to prevent an "unknown unknown" risk event outside the control of either party triggering termination of the contract because of frustration.

However a type (c) risk event is one in which the law steps in to determine the outcome by terminating the contract. Frustration occurs "whenever the law recognizes that without default of either party a contractual obligation has become incapable of being performed because the circumstances in which performance is called for would render it a thing radically different

from that which was undertaken by the contract ...".²⁸ That is, the contract does not allocate the consequences of the risk happening to either party.

It is submitted that the more work done to convert "unknown unknowns" into "known unknowns", or to convert "known unknowns" into "known knowns", the better the project scope will be defined, and the fewer and smaller the risks will be. In other words, careful attention to the contractual terms which define the obligations of each party and the scope of time, cost and quality will reduce contractual risk.

The choice of contract type

For the purposes of this paper, the term construction contract is confined to contracts in which construction of a physical structure is undertaken, thereby excluding e.g. design contracts etc. Even with this limited definition, there are a number of more or less distinct species of construction contract, as a perusal of the list of standard forms published by organisations such as the Joint Contracts Tribunal, Australian Standards and Consensusdocs (US) will confirm.

Although there are various ways of distinguishing one type of contract from another, what is significant for present purposes is the extent to which each contract party, Employer or Contractor, assumes contractual risk. Considering contractual risk as the aggregation of time, cost, quality (and perhaps design) issues, the following hierarchy lists "adversarial" contracts in increasing order of Employer risk and decreasing order of Contractor risk:

- EPC/turnkey
- Design and construct
- "Traditional" (design-bid-build)
- Management contracting/Project management
- Construction management.

Within any one of these categories there can be a spectrum of risk allocation, e.g. the lump sum, measurement or "cost plus" variants of a traditional construct only contract. These types of contracts are termed "adversarial" because of the way in which the legal rights and obligations of each party are formalised in the traditional way by means of the contract. Typically, assuming more risk also means more control over the relevant risk events. By contrast, the risk allocation in modern contracting arrangements such as alliancing or partnering explicitly seeks to manage execution of the contract co-operatively to share risks and rewards on an equitable basis, and eschew disputes between parties.

It is submitted that in practice, an Employer procuring a project must make a trade-off between his/her desires in respect of time, cost and quality. A quick, cheap and high-quality project is an oxymoron. It is therefore

suggested that parties who understand what each type of contract can and cannot achieve in respect of time, cost and quality, and who takes the risks, will make the biggest contribution in minimising risks by selecting the most appropriate form of contract that increases the likelihood of achieving the most important outcome(s). The differences between the different types of contract are essentially in who manages and controls particular risks. The characteristics and risk allocation of some of these types of contract are broadly as follows.

Construction management/EPCM is an appropriate form of contract for an Owner who wants to have ultimate control of the quality of construction, whilst endeavouring to minimise the overall elapsed time. By directly contracting the designers and trade subcontractors, coordinated by a Construction Manager, the Owner retains control and supervision of quality. If required, a CM managed project can be "fast tracked", in which construction starts before the design is completed. The Owner minimises its quality risk by appropriate selection and management of its designers and Construction Manager. However, it will generally assume both time and cost risk.

"Traditional" (design-bid-build) procurement can deliver the lowest cost project whilst giving the Owner substantial control over the quality of the finished product because it engages the designers directly. Successful design-bid-build with minimal variations requires that the design be completed before bids are sought for construction. Accordingly, this contractual approach generally cannot deliver a project in the minimum feasible time.

Design-construct is an appropriate approach for an Owner who wants a project completed in minimum time for a defined price. The contractor assumes responsibility for design, thereby eliminating one source of potential disputes between Owner and contractor - late delivery of or errors in design documentation. However, as the design is the responsibility of the contractor, the Owner will have limited opportunity to influence or control the resulting quality. It is apparent from this brief summary of the different types of construction contract that there are "horses for courses". An owner that requires time and price certainty is ill-advised to adopt Construction Management, amply demonstrated by the time and cost overruns on Scottish Parliament House.²⁹ An owner that requires the shortest possible construction time will need to select an alternative to traditional contracting, perhaps design and construct. However, it cannot expect to have the same level of control over the quality of the finished facility as it would under the traditional design-bid-build procurement. Thus, it is suggested that irrespective of the specific terms of the contract, if the type of contract is inappropriate for the owner's most important criteria for success, the risks of not achieving its objectives will be higher than necessary.

Risk and contract forms

In a 1996 paper, Fenn et al reported the results of a significant survey

of users of Standard Form Contracts.³⁰ This survey endeavoured to determine users' perceptions of the influence of the form of contract on the incidence of disputes. The survey reports on the perceived expectancy of disputes of users of 14 different standard form contracts. The contracts were various standard forms published by IChemE, JCT (including design and build), ICE (including design and build) and GC Wks 1 (Central government form). The statistical results presented were derived from a total of 1873 uses of Standard Form contracts. In addition, there were 117 uses of a one-off or bespoke contract reported. It was found that there were significant differences between some contract forms in the expectation of disputes. In particular the NEC, IChemE and JCT 81 Design and Build forms were found to have a significantly lower expectation of disputes than the JCT 80, ICE (5th ed) and GC Wks 1. It is interesting to note that the bespoke contracts had the highest expectation of disputes, followed closely by GC Wks 1. It is submitted that this data suggests that, as some contract forms are perceived to result in a higher incidence of disputes than others, some contract forms are higher risk than others.

Risk is an explicit consideration in the NEC suite of contracts. Transparent allocation and reduction of risk is a stated aim of the drafting of each of the different forms.³¹ The most significant contribution of the NEC contracts to contractual risk reduction may be in the specific obligation to establish and maintain a risk register. Good risk management practice is thereby promoted by the requirements of the contract itself. The experience of the widespread use of NEC contracts over the period of 15 years since the first edition appears to confirm its success. Lloyd recently reported that there is only one significant judicial decision in that period involving NEC contracts.³² This does seem to indicate that in comparison to other standard form and bespoke contracts over the same period, NEC contracts resulted in less disputes and therefore reduced contractual risk.

In 2002, Sidwell et al investigated 10 Australian projects and found 15 project related factors which were critical to project success. Of these, four factors explained 65% of the overall performance variance, which the authors stated was consistent with findings by other researchers. Included in these four factors was equitable allocation of risk:

"Effective risk identification, analysis and management techniques together with equitable distribution to those parties best able to cope with the risk are now well accepted as key determinants of successful projects".³³

Conclusion

Every contract has risks that the contract objective will not be achieved because of a shortfall in one or more of the contractual expectations of time, cost and quality. Notwithstanding the well documented history of problems with many construction contracts, some projects are successful because there is no shortfall between contractual expectations and performance. Whilst such outcomes can be a statistical outcome of probability in that risks did not materialise or impact achievement of the

contract objective, it is suggested that risk management is a central feature of many successful projects. This paper has suggested that the contract has a central role to play in risk minimisation. Firstly by selection of the appropriate form of contract that gives priority to the most important aspects of delivery of the Employer's project. Secondly, the terms of the contract can have a positive effect in minimising contract risk by "allocating" risks to the party best able to "control" them.

Thirdly, the contract can promote the co-operative management of risks by its formal execution and reporting requirements, rather than leaving them as the individual responsibility of one party to deal with during

execution of the project. Risks that have been understood, analysed and evaluated can often be treated (controlled) to reduce the likelihood of occurrence, the nature of the risk or the impact of occurrence. Such "contractual" risk management, it is submitted, can reduce the overall contractual risk. Risks can also be ignored or inappropriately "controlled", resulting in an increased risk that the contract objective will not be achieved. It is submitted that contractual risk is therefore not a zero sum game.

- 1 US Department of Transportation Federal Highway Administration, *Risk Assessment and Allocation for Highway Construction Management* (2006) §6.1 <http://www.international.fhwa.dot.gov/riskassess/risk_hcm06_06.cfm>
- 2 Andrew Wolstenholme, Ian Fugeman & Fiona Hammond, 'Heathrow Terminal 5: delivery strategy' (2008) 161 No CE5 *Proceedings of the Institution of Civil Engineers - Civil Engineering* 10, 12
- 3 Christopher Kerin, 'Risky business: Risk management cruises into the 21st century' (2008) 24 *Building and Construction Law* 94, 116
- 4 *Robinson v Harmon* (1848) 1 Ex 850, 855; (1848) 154 ER 363, 365
- 5 *Thorn v London County Council* (1876) 1 App. Cas. 120, 128 & 135
- 6 e.g. the contract referred to in *Thiess Services Pty Ltd v Mirvac Queensland Pty Ltd* [2005] QSC 364; [2006] 22 BCL 218
- 7 *Ruxley Electronics Limited v Forsyth* [1996] AC 344, 358 per Lord Jauncey of Tullichettle
- 8 G A Leonards 'Investigation of Structural Failures' (1982) No GT2 (February) *Journal of the Geotechnical Engineering Division* (ASCE) 108
- 9 e.g. NPWC/NBCC Joint Working Party, 'No Dispute Strategies for Improvement in the Australian Building and Construction Industry' (May 1990); Sir Michael Latham, 'Constructing the Team' (July 1994) Final Report; Sir John Egan, 'Rethinking Construction' (1998); CTC for Construction Innovation, 'Guide to Leading Practice or Dispute Avoidance and Resolution' (2009) http://www.construction-innovation.info/images/pdfs/DAR_Guide.pdf
- 10 The former U.S. Secretary of Defense Donald Rumsfeld presented his trichology at a Defense Department Briefing on February 12, 2002: "Reports that say that something hasn't happened are always interesting to me, because as we know, there are "known knowns"; there are things we know we know. We also know there are "known unknowns"; that is to say we know there are some things we do not know. But there are also "unknown unknowns" – the ones we don't know we don't know." <http://en.wikipedia.org/wiki/Unknown_unknown>
- 11 AS/NZS 4360:2004 Risk Management
- 12 P Dallard et al The 'London Millennium Footbridge' [2001] V79 No 22 *The Structural Engineer* 17, 21
- 13 e.g. 14 reports on construction since 1944 are listed in Peter Fenn, 'Why construction contracts go wrong (or an aetiological approach to construction disputes)' (Paper given at a meeting of the Society of Construction Law, Derbyshire, 5 March 2002)
- 14 e.g. according to one survey, more than one third of the owners of major new construction projects in the US are involved in arbitration or litigation of construction contract claims: B Bramble & M Callahan, *Construction Delay Claims* (3rd ed, 2000) 16-6
- 15 Report by NPWC/NBCC Joint Working Party, 'No Dispute Strategies for improvement in the Australian building and construction industry' (May 1990) 7
- 16 Max W Abrahamson, 'Risk Management' (1983) *International Construction Law Review* 241, 244
- 17 "Standard Conditions of Contract" (2001) 4 BDPS News 1, 4
- 18 <<http://www.consensusdocs.org/about.html>> [25 November 2008]
- 19 Brian Eggleston, *The New Engineering Contract A Commentary* (1996) 7
- 20 Orgalime Turnkey Contract for Industrial Works
- 21 International Chamber of Commerce Model Turnkey Contract for Major Projects (2007) <<http://www.iccbooks.com/Product/ProductInfo.aspx?id=488>> [25 November 2008]
- 22 <http://www.bimco.org/Corporate%20Area/About/BIMCO_a_century_of_service.aspx> [25 November 2008]
- 23 Leading Oil and Gas Industry Competitiveness (LOGIC) <www.logic.com>
- 24 "The governing principle is that risk should be allocated to whichever party from the public or private sector is best placed to manage it. The optimal allocation of risk, rather than maximising risk transfer, is the objective, and is vital to ensuring that the best solution is found." HM Treasury, *The Green Book Appraisal and Evaluation in Central Government* <<http://greenbook.treasury.gov.uk/annex04.htm>> [26 August 2008]
- 25 "Both the government and the private party should seek to ensure that cost and adequate risk transfer are balanced as far as possible to achieve the best value for money on a particular project." Department of Treasury and Finance Victorian Government, *Partnerships Victoria Updated Standard Commercial Principles* (2008) 99
- 26 "A fundamental tenet of risk management is to allocate the risks to the party best able to manage them. The party assuming the risk should be able to best evaluate, control, bear the risk of, and benefit from its assumption." US Department of Transportation Federal Highway Administration, *Risk Assessment and Allocation for Highway Construction Management* (2006) §6.1.1 <http://www.international.fhwa.dot.gov/riskassess/risk_hcm06_06.cfm>
- 27 NPWC/NBCC Joint Working Party, 'No Dispute Strategies for Improvement in the Australian Building and Construction Industry' (May 1990) 6-7; Sir Michael Latham, 'Constructing the Team' (July 1994) Final Report 37
- 28 *Davis Contractors Limited v Fareham Urban District Council* [1956] AC 696, 723
- 29 Scotland, A Report by the Rt Hon Lord Fraser of Carmyllie QC, *The Holyrood Inquiry*, SP Paper No 205 (2004)
- 30 Peter Fenn, David Lowe & Christopher Speck, 'Conflict and dispute in construction' (1997) 15 *Construction Management and Economics* 513
- 31 Brian Eggleston, *The New Engineering Contract A Commentary* (1996) 7
- 32 Humphrey Lloyd, 'Thoughts on NEC3' (2008) 25 *International Construction Law Review* 468, 470
- 33 AC Sidwell, RJ Kennedy & APC Chan, 'Re-engineering the Construction Delivery Process' (2002) *Construction Industry Institute Australia Report* 6