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Managing Risk

by

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'It is only by risking our persons from one hour to another that we live at all.'

William James, 1897

1. Synopsis

It is an accepted principle that the function of a contract is to define upon whom the various risks of an enterprise shall fall. The purpose of a contract is therefore to allocate the risks between the contracting parties.

However, before one could begin to properly understand the risk provisions in a standard form of a construction contract and how the risks are allocated, one must understand the basic concepts of the topic of Risk and its management.

This paper therefore, sets out first these basic concepts and then deals with risk allocation and the relevant provisions of the 1999 three major contract forms of FIDIC: The 1999 Red, Yellow and Silver Books with some references to the Multi Lateral Development Banks' Harmonised Contract, which was recently published.

2. Introduction into the Topic of Risk

2.1 It is accepted that where work environment is concerned the exposure to hazards and risks are highest in the construction fields of activity. An extensive matrix of risks can be identified as being shared by most, if not all, construction projects.[1] Further risk matrices should be added when a specific project is being considered and analysed. These risks can be classified in many ways, but the most appropriate is the chronological classification which divides the risks into pre-construction; construction; and post-construction phases. Each of these phases can be sub-divided

[1] "Risk and Insurance in Construction", by Nael G. Bunni, Spon Press, Second Edition, Chapter 3 – The Spectrum of Hazards & Risks in Construction, London, 2003.

into further matrices again based on chronology. Figures 2.3; 3.1; 3.2; 3.3; 3.6; 3.9; and 3.11 taken from the Author's book on Risk and Insurance in Construction, provide a general idea of risk distribution.[2]

2.2 Once these risks are identified, a decision has to be made by the Employer on whether they are accepted or have to be mitigated; on whether they are retained by the Employer or spread to other parties, such as for example, the Contractor or Insurers.[3]

2.3 The allocation of risks to the various parties in a contract has a significant impact on the type of contract form that one might appropriately use. In this connection, it is worth mentioning that if Risks are not allocated in the contract, then an arbitrator or ultimately a court would usually be charged with the task of that allocation and in doing so they might use one of four established criteria for such an allocation, as discussed below.

2.4 The process by which risk allocation is carried through is part of the process of Risk Management, as defined in paragraph 4.1 below. In construction contracts, risk allocation is based on the concept of control of the risk and/or its consequences. Risk management also includes the mitigation of those risks deriving from any unavoidable hazards through specifying warning and safety devices and risk control procedures that have to be planned and implemented, such as contingency and emergency action plans.

2.5 It is important to emphasise that the risks to which a construction contract is exposed are spread throughout the whole of the Conditions of Contract. Some make the mistake in assuming that Clause 17 of the 1999 FIDIC contracts is the only clause that deals with Risk. As will be seen later the risks referred to in that clause are only those which deal with loss, damage and/or injury.

[2] As in Reference 1, but see Figures 2.3; 3.1; 3.2; 3.3; 3.6; 3.9; and 3.11 on pages 46, 54, 62, 71, 82, and 115 respectively.
[3] As in Reference 1, but see Figures 2.1 on page 35.

2.6 Whatever the rules or the reasons for allocation of risks, the responsibility and liability attaching to these risks, if and when a risk eventuates, follow and flow from that allocation. Accordingly, the simplicity and clarity of the wording where such allocation is made could be of paramount importance. This means that the contractual arrangements, the legal rules of the applicable law of the contract between the parties and the technical documentation, including the specifications and drawings, must be clearly and, as far as possible, explicitly stated so that they could be fully understood.

2.7 Once liabilities are assigned through the contract documents, the parties involved have a number of options to adopt to safeguard the project and have various options to finance the consequences of risks should they eventuate. Of course, in general terms, liabilities arising from the duties and obligations of the parties to a contract should be covered by indemnities given by one party to the other, or provided in one form or another, including the provision of insurance policies. Thus, the logical sequence that emerges is a flow from Risk to Responsibility to Liability to Indemnity to Insurance.

Insert and Note the Figures on Risk Matrices on pages 4a to 4h

- 4a - Figure 2.3 – Spectrum of risks in construction;
- 4b - Figure 3.1 – Risks associated with the feasibility stage;
- 4c - Figure 3.2 – Risks associated with the design stage;
- 4d - Figure 3.3 – Risks during construction associated with the site of the project and its location;
- 4e - Figure 3.6 – Risks during construction associated with the technical aspects of the project;
- 4f - Figure 3.9 – Risks during construction associated with acts of man;
- 4g - Figure 3.11 – Risks associated with the post-construction stage; and
- 4h - Figure 2.1 – Hazards exist.

3. The Meaning of Risk

3.1 The subject of Risk, its assessment, allocation and management has developed and is being applied on an increasing scale over the last twenty years. New Regulations and uses such as the Health and Safety at Work Regulations introduced in a number of jurisdictions and in particular those imposed in the European Union gave the subject of Risk an even greater significance. Thus, amongst the requirements introduced in the European Union through the Construction (Design and Management) Regulations 1994, 'CDM', there is a requirement to carry out risk assessment of planned work at different stages of the construction project and to take reasonable measures to deal effectively with any significant risk.

3.2 However, there is little uniformity of approach to the topic of risk and, surprisingly, only a few useful general practical applications have been developed in this area. The lack of uniformity relating to risk extends even to the definition of "*Risk"* and what is meant by it. Etymologically, the origin of the word 'risk' in English; 'risqué' in French; and 'rischis' in Italian is uncertain. The Latin word 'resecum' meaning 'danger' or 'rock' may throw some light on its origin, but the Chinese '*wej-ji'* with the characters representing 'chance' and 'danger', is more illustrative of the technical concept of risk as it applies to the construction industry today. This concept has evolved with these two notions embodied in it. It encompasses with every decision one makes not only the danger of a loss but also the chance of either obviating it or the chance of making a consequent gain.[4]

3.3 Decision making often, if not always, involves some risk taking. However, the well informed decision maker would have been aware of the risks associated with a made decision and will endeavour to reduce all foreseeable harmful effects and their consequences to an acceptable minimum.

[4] "The FIDIC Forms of Contract", by Nael G. Bunni, Blackwell Publishing, Third Edition, Chapter 7, Oxford, 2005.

3.4 The definition of Risk in British Standard No. 4778: Part 3, Section 3.1: 1991,[5] is slightly out of date, as it only includes negative consequences or adverse events. It defines "Risk" as ***'A combination of the probability, or frequency, of occurrence of a defined hazard and the magnitude of the consequences of the occurrence'***. In the same British Standard, the definition of hazard is given as ***'A situation that could occur during the lifetime of a product, system or plant that has the potential for human injury, damage to property, damage to the environment, or economic loss'***.

3.5 However, a more up to date definition is a wider definition that includes the positive consequence of a risk when it eventuates. It is a more accurate definition, given by the Australian/New Zealand Standard on Risk Management, AS/NZS 3951: 1995, which defines risk as inclusive of not only loss or damage, but also gain.[6] Therefore, the word "hazard" in the definition given by the British Standard, quoted above, is replaced by a more neutral word an "event" that may result in either a positive or a negative consequence.

3.6 Based on these definitions, Risk may be expressed in the form of a mathematical equation, as follows:

Risk = Probability, or frequency, of the occurrence of a defined event x Consequences of the occurrence of that event; or R = P x C.

There are a number of points that flow from the meaning of risk and its mathematical expression shown above, which are outside the scope of this paper, but could be explored through various publications on Risk.[7]

[5] British Standard No. 4778: Part 3, Section 3.1: 1991, The British Standard Institution, Milton Keynes, UK.
[6] "Australia/ New Zealand Risk Management Standard", by Roger Keey, part of a book entitled "Owning the Future", edited by Mr. Elms & published by the Centre for Advanced Engineering, University of Canterbury, Christchurch, New Zealand, 1998.
[7] See Reference No. 1 above and also "The FIDIC Forms of Contract", by Nael G. Bunni, Blackwell Publishing, Third Edition, Chapter 7, Oxford, 2005.

4. Risk Management

4.1 As stated earlier, Risk management is ***'the process whereby decisions are made to accept a known or assessed risk and/or the implementation of actions to reduce the consequences or probability of occurrence'.*** As stated above, Risk Management is also concerned with the mitigation of those risks deriving from any unavoidable hazards through an optimum specification of warning and safety devices and risk control procedures. Furthermore, if a decision is made to accept a risk, a further decision must be made on whether or not the risk should be spread. Before such decisions can be made, it is necessary to go through a systematic process which involves analysis of the possible hazards to which the project may be exposed and evaluation of their intensity, frequency and return period.

4.2 The process specified by BS 4778 starts with analysis of the hazards to which the project is exposed; quantification of the risks; evaluation of the risks; and finally an assessment of the outcome. That process comes under scrutiny of the Risk Manager using a certain Risk criteria that had been specifically designed for the project. In this regard, the following terms and definitions from BS 4778 are relevant:

Hazard analysis	The identification of hazards and the consequences of the credible accident sequences of each hazard.
Risk quantification	The estimation of a given risk by a statistical and/or analytical modeling process.
Risk evaluation	The appraisal of the significance of a given quantitative (or, when acceptable, qualitative) measure of risk.
Risk assessment	The integrated analysis of the risks inherent in a product, system or plant and their significance in an appropriate context.
Risk criteria	A qualitative and quantitative statement of the acceptable standard of risk with which the assessed risk needs to be compared.

5. Allocation of Risks and their Management in Construction Contracts

5.1 When hazards and risks are identified, assessed and analysed, they must be allocated to and managed by one or more of the various parties involved in the construction project or to others, including insurers and society in general. Allocation and management of the events, hazards and risks would keep them under control, prevent the occurrence of any harmful consequences or mitigate such consequences should they eventuate, thus reducing the extent of harm. As stated above, such allocation is part of the risk management process, where the party to whom a certain hazard and associated risk are allocated should be selected in accordance with certain rules rather than haphazardly.

5.2 The conclusions of one of the earliest papers on this topic remains valid today, where the rules for allocation of risks in a construction project were stated to revolve around the ability of a party to:[8]

(a) control any arrangements which might be required to deal with the hazard or any triggering incident relating to it;

(b) control the risk or to influence any of its resultant effects;

(c) perform a task relating to the project, such as, obtaining and maintaining insurance cover; and

(d) benefit from the project.[9]

[8] "Risk Management", Max W. Abrahamson, [1983] ICLR 241, also published as Appendix J to a discussion paper on 'Construction, Insurance and Law' published by FIDIC - 1986, page 49; see also "Defects: A summary and analysis of American Law", Justin Sweet, a paper published in *Selected Problems of Construction Law, International Approach*, by Peter Gauch (Switzerland) and Justin Sweet (USA), University Press, Fribourg, Switzerland, Sweet & Maxwell, London, 1983, page 97.

[9] As an example of the "benefit" principle, although referred to as "incentive" and not benefit, we can look at The NEC, which is commented on in the Grove Report, referred to below in reference 5, in the following manner: ***"The NEC is said to have introduced a variant of the management standard which might be called the philosophy of incentive. The postulate is that risks should be placed on the party most in need of incentive (presumably already with the ability) to prevent and control them. This is thought to motivate people to play their part. An examination of the "compensation events" listed in the ECC does not, however, demonstrate that this philosophy has been uniformly applied."***

5.3 Although these rules were contemplated in 1983, their application was recently preferred to any other rules by a major report commissioned by the Government of Hong Kong SAR on the allocation and management of risk in the procurement of construction projects.[10] These rules and others were later debated at a conference in Hong Kong, which focused on the report and related issues.[11]

5.4 It might be worth noting in this connection that if risks are not allocated in a contract and a dispute arises between the parties to that contract as to whom a particular risk is allocated, then an arbitrator or a judge would most likely examine the following criteria for risk allocation and determine the dispute accordingly:

1. **which party could best foresee that risk?**
2. **which party could best control that risk and its associated hazard or hazards?**
3. **which party could best bear that risk?**
4. **which party most benefits or suffers when that risk eventuates?**

5.5 There are examples and legal judgments in respect of events, where the liability was allocated in accordance with each of the above criteria. However, the allocation in construction contracts of the risks is traditionally based on a sharing between the parties involved, in accordance with the provisions of two contracts usually executed between the Parties to a construction contract: The first is between the Employer/Owner and the Design professionals involved; and the second is between the Employer/Owner and the Main Contractor. From the latter agreement, flows another line of risk sharing between the main contractor, on the one hand, and sub-contractors, suppliers, manufacturers, insurers and others, on the other hand.

5.6 **The Contract between the Employer/Owner and the Design Professional**: The standard form used by FIDIC for this type of Contract is the White Book, which is in its third edition. This first type of contract does not include in its provisions

[10] "The Grove Report: Key Terms of 12 Leading Construction Contracts Are Compared and Evaluated", published in September 1998 and is available on the web site of Thelen Reid & Priest at (www.constructionweblinks.com).

reference to the topic of Risk. Instead it leaps directly to Liability and Insurance in its Articles 16 to 20, although, as explained above, these two topics flow from Risk.

5.7 **The Contract between the Employer/Owner and the Main Contractor:** It is imperative to understand that the risks in this second type of contract are dealt with on the basis of the effect they generate, if and when they eventuate. The effect can be one of two possibilities, as follows:

(a) the first effect relates to risks which could lead to damage, physical loss, or injury, if and when they eventuate; and

(b) the second effect relates to risks which could lead to economic and/or time loss, if and when they eventuate.

In this type of contract, the risks allocated to the Employer/Owner are specified in the Contract Conditions whilst the remaining risks are allocated to the Contractor. These two types of Risk and their consequences are shown in Figures 4.1 to 4.3, attached at the end of the paper,[12] for the contract between Employer and Contractor, with specific reference to the FIDIC Forms of Contract. They also apply to the Multi Lateral Development Banks Harmonised Contract. It is important that those three figures are understood if one is to acquire an understanding of the topic of Risk and its distribution in Conditions of Contract for construction.

5.8 Examples of the first type of effect which involves damage, physical loss or injury include defective design, defective material, defective workmanship, Acts of God, fire, human error and failure to take adequate precautions. Examples of the second type include late possession of the site, delay in receipt of information necessary for timely construction, changes in design, and variations to the original contract.[13] The treatment of these two types of risk in construction contracts differs in that the first type encompasses mainly insurable risks, which are required to be insured, whereas the second type involves in essence uninsurable risks.

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[11] A conference in Hong Kong held in November 2000, details of which were given by Humphrey LLoyd in the International Construction Law Review, [2000] 2 ICLR 302.

[12] As in reference 1 above, but Figures 4.1 to 4.3 on pages 134 to 136.

5.9 Unfortunately, the division of risk as explained above is not clearly and explicitly set out in a number of the well known standard forms of contract, a problem that has resulted in major misunderstandings. As an example, the wording of Sub-clause 17.1 of the new suite of FIDIC's forms of Contract, published in September 1999, should have started by explaining that the risks included under Clause 17 of the Conditions are only those Risks of Loss and Damage and not the whole spectrum of the risks to which the project and the parties involved in it are exposed. The term "Employer's Risks" in the context of this clause should have been replaced by "Employer's Risks of Loss and Damage", since these risks are confined to those which lead to some form of accidental loss or damage to physical property or personal injury, which in turn may lead to economic and/or time loss risks, directly or through the other clauses of the contract.

5.10 As this explanation is not stated in the Conditions, the mistake of referring to the risks under Clause 17 as "Employer's Risks" could lead to serious danger in that the reader, and of course the user, will conclude that having identified in Clause 17 the Employer's Risks, all the other risks are the Contractors' risks, including the contractual risks in the remaining provisions of the contract. This problem can be highlighted by reference to Clause 17 of the Orange Book,[14] where the draftsman fell into that trap and stated expressly in Sub-clause 17.5 that ***"The Contractor's risks are all risks other than the Employer's Risks listed in Sub-Clause 17.3".*** This mistake has led to many instances of misunderstanding, conflict and at least one serious arbitral proceedings, where the employer pointed out that by Sub-clause 17.5 he bears no risks under the contract other than those specified in Sub-clause 17.3.[15]

5.11 The same could be said about other well known forms of contract, including the recently published Multi Lateral Development Banks Harmonised Contract.

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[13] "Construction, Insurance and Law", Nael G. Bunni, a paper delivered at a Conference on Structural Failure, Product Liability and Technical Insurance, Technische Universitat, Vienna, 1989, and published subsequently in *Forensic Engineering*, V. 2, Nos. 1/2, page 163, 1990.

[14] The draftsman of the new suite of FIDIC's contracts, published in 1999, applied the same format of the 1995 Orange Book to these new forms.

[15] "FIDIC's New Suite of Contracts – Clauses 17 to 19: Risk, Responsibility, Liability, Indemnity and Force Majeure", by Nael G. Bunni, ICLR, Vo. 18, Part 3, July 2001.

6. Responsibility and liability

Whatever the rules or the reasons for allocation of risks, the responsibility and liability attaching to these risks, when they eventuate, follow and flow from that allocation. Once again, it is worth repeating that the simplicity and clarity of the wording where such allocation is made is of paramount importance. Once liabilities are assigned through the contract documents, the parties involved have the following options to finance the consequences of risks should these risks eventuate:

(a) To retain the responsibility for financing the costs of loss or damage or injury by providing any one or a combination of the following arrangements:
   (i) an element of their cash flow;
   (ii) reserves created specifically for the purpose;
   (iii) funds assigned;
   (iv) creating captive societies.

(b) To transfer the responsibility for financing the costs of loss or damage or injury or non-performance to:
   (i) another party to the contract by agreement, thus creating a sharing of risks;
   (ii) an insurer through an insurance contract which in turn becomes transferred to reinsurers through reinsurance arrangements. An insurer may impose his own risk management conditions, thus creating another cycle of transfer.

   This second cycle of transfer which is enforced through either an incentive in premium reductions or conditions attached to the insurance policies may result in:

   - the insured having to take measures to eliminate or mitigate a certain risk;
   - the insured having to retain part of the responsibility by the imposition of a deductible or excess at the lower end of the scale, or a limitation of the part insured at the upper end of the scale;
   - the insured having to retain certain risks through exclusion clauses in the insurance policy; or

- the insured having to seek another insurance cover from a different insurer.

7. Indemnity and Insurance

Generally, liabilities arising from the duties and obligations of the parties to a contract should be covered by indemnities given by one party to the other, or provided in the form of insurance policies. The above characteristics of Risk, Responsibility, Liability, Indemnity and Insurance also apply to the Multi Lateral Development Banks Harmonised Contract.

8. Risk, Responsibility, Liability, Indemnity and Insurance in FIDIC's 1999 Red, Yellow and Silver Books

8.1 One of the common features of all three of the 1999 Books of FIDIC for major works is the section on Risk & Responsibility, Insurance and Force Majeure. The wording of Clauses 17, 18 and 19 in the three main contracts, The 1999 Red; Yellow; and Silver Books, is very similar. It differs only in the text shown in the attached tables, most of which is either of a minor nature or due to the respective role of the "Engineer" or the "Employer" in these Forms. There are only two significant differences, those numbered 4 and 7, which are marked with an asterisk.

8.2 Tables 1 to 3 below provide a comparison between the wording of these Clauses, using the new Yellow Book as a base-line. In this connection, it should be noted that whereas the risks of economic and time loss are very different, the risks of loss and damage are not that different. However, they are sufficiently different to require different insurance provisions.

Table 1- Differences between the new Yellow Book compared to the new Red Book and the new Silver Book – Clauses 17, 18 and 19.

Clause 17: Risk & Responsibility

No.	Clause No.	Yellow	Red	Silver
1.	17.1 (a)	"… by reason of the design, execution …."	"… by reason of the Contractor's design (if any), the execution …"	Same as Yellow.
2.	17.1 (b) (i)	"…. by reason of the design, execution …."	"…. by reason of the Contractor's design (if any), the execution …."	Same as Yellow.
3.	17.1 (b) (ii)	"… is attributable to any negligence, willful act or breach of the Contract by the Contractor, the Contractor's Personnel, their ..."	Same as Yellow.	"… is not attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Personnel, their …"
4.*	17.3	Risks referred to in Sub-Clause 17.4 are number (a) to (h) in Yellow.	Same as Yellow.	Risks (f), (g) and (h) do not appear in Silver.
5.	17.4, first paragraph	"…. give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer."	Same as Yellow.	"…. give notice to the Employer and shall rectify this loss or damage to the extent required by the Employer."
6.	17.4, second paragraph	"…. give a further notice to the Engineer and shall be …."	Same as Yellow.	"…. give a further notice to the Employer and shall be …."
7.*	17.4 (b), last sentence	"In the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 [*Employer's Risks*], reasonable profit on the Cost shall also be included."	Same as Yellow.	Does not appear in Silver.

No.	Clause No.	Yellow	Red	Silver
8.	17.4, last paragraph	"…. this further notice, the Engineer shall proceed …."	Same as Yellow.	"…. this further notice, the Employer shall proceed …."
9.	17.5(a)	"…. compliance with the Employer's Requirements, or …"	"…. compliance with the Contract, or …"	Same as Yellow.
10.	17.5, fourth paragraph	"…. in relation to (i) the Contractor's design, manufacture, construction or execution of the Works, (ii) the use of Contractor's Equipment, or (iii) the proper use of the Works."	"…. in relation to (i) the manufacture, use, sale or import of any Goods, or (ii) any design for which the Contractor is responsible."	Same as Yellow.

Clause 18: Insurance

No.	Clause No.	Yellow	Red	Silver
1.	18.1, second paragraph, second sentence	"…. by both Parties before the date of the Letter of Acceptance."	Same as yellow.	"…. by both Parties before they signed the Contract Agreement."
2.	18.1, seventh paragraph, last sentence	"Whenever evidence or policies are submitted, the insuring Party shall also give notice to the Engineer."	Same as Yellow.	This sentence does not appear in Silver.
3.	18.2, second paragraph	"…. damage caused by the Contractor in the course of any other operations (including those under Clause 11 [*Defects Liability*] and Clause 12 [*Tests after Completion*]."	"…. damage caused by the Contractor in the course of any other operations (including those under Clause 11 [*Defects Liability*]."	"…. damage caused by the Contractor or Subcontractors in the course of any other operations (including those under Clause 11 [*Defects Liability*] and Clause 12 [*Tests after Completion*]."

No.	Clause No.	Yellow	Red	Silver
4.	18.2, fourth paragraph, item (d)	"… damage to a part of the Works which is attributable to the use or occupation by the Employer or another part of the Works, and loss or damage from the risks listed in sub-paragraphs (c), (g) and (h) of Sub-Clause 17.3 [*Employer's Risks*], excluding (in each case) risks which are not insurable at commercially reasonable terms, with deductibles …"	Same as Yellow.	"… damage from the risks listed in sub-paragraph (c) of Sub-Clause 17.3 [*Employer's Risks*], with deductibles …"
5.	18.4, second paragraph	"The Employer and the Engineer shall also be …"	Same as Yellow.	"The Employer shall also be …"

Clause 19: Force Majeure

No.	Clause No.	Yellow	Red	Silver
1.	19.4, last paragraph	"After receiving this notice, the Engineer shall proceed …."	Same as Yellow.	"After receiving this notice, the Employer shall proceed …."
2.	19.6, second paragraph	"Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include: …"	Same as Yellow.	"Upon such termination, the Employer shall pay to the Contractor: …"

Insert and Note Figures 4.1 to 4.3 on pages 16a, 16b and 16c

16a - Figure 4.1 – Risks of injury and/or damage;
16b - Figure 4.2 – Risks resulting in economic and/or time loss; and
16c - Figure 4.3 – Risks as specified in FIDIC's Red Book and the ICE Form.

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