

In the name of Allah, the Compassionate, the Merciful

**RISK ALLOCATIONS IN STANDARD FORMS OF
ENGINEERING AND CONSTRUCTION
CONTRACT**

by

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A thesis submitted to the
Faculty of Engineering
of the
University of Birmingham
for the degree of
Doctor of Philosophy

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March 1997

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ABSTRACT

The underlying hypothesis for this research is that within the construction industry, some risks are allocated in a way which might not optimise the benefits to the parties involved. In essence, this could be generating more disputes at site level and above, in construction contracts due to the conflicting views surrounding them. There could be much improvement in the way they are allocated for the ultimate reduction in the incidence of disputes and therefore in the construction cases that eventually need arbitration and possibly, litigation. In turn, this leads to increased productivity of construction and greater competitiveness for the industry clients.

In practice, there are many factors which influence the risk allocation option models currently adopted. This thesis attempts to show a thorough investigation of the option models adopted, the factors that are influencing their adoption along with a complete in depth analysis for future improvement. It also attempts to show the hypothetical impact of option models which are not adopted and whether they could provide the improvement needed towards the main objectives which are a reduction in the incidence of disputes and greater productivity of the industry.

Risk allocations are mostly implemented through relevant conditions or clauses within forms of contract between the client and contractor or within the contract between the client and his designer. Other risk transfer routes include insurance contracts and contracts of professional indemnities.

Risk allocations are based on certain principles even though these principles are not based on a robust theory. However, these principles underpin the different models of risk allocation. The research sought to identify those principles which are not always self-evident or well understood.

This thesis also includes an invaluable database of industry interviews and surveys that helped achieve the aims and objectives of this research.

DEDICATION

**In loving memory to my sister and brother Hala and Osama
and to the parents and family who have endured their loss.**

ACKNOWLEDGEMENTS

The author wishes to express his deeply indebted gratitude to his supervisor, Professor J.G. Perry, Beale Professor and Head of the School of Civil Engineering, University of Birmingham, whom without his help, patience, guidance and, his intellectual input, non of this would have been possible.

Thanks are also expressed to the School of Civil Engineering, University of Birmingham, for providing the author with the opportunity to conduct this research, in particular Professor M.S. Snaith. In addition, the author also likes to express his gratitude to all the staff members of the School who provided their help, each in their own individual ways.

The author is also grateful to all the industry practitioners who made the effort to provide invaluable data during the course of this research.

The author is also in debt to many friends who provided him with their support and encouragements.

Last, but not least, the author would like to thank his parents Kamal and Hayat, his brothers and sisters, Hiba, Mohamed, Sami, Hadeel, and Muhannad, each for their individual support throughout the time he was conducting this research. The author hopes that they will now take pride in its completion, for they have provided a profound source of encouragement.

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EXPLANATION OF TERMS AND ABBREVIATIONS

NEC	New Engineering Contract 1st Edition.
ECC	Engineering and Construction Contract (NEC 2nd Edition).
ICE 5th Edition	Institution of Civil Engineers, Standard Form of Contract, 5th Edition.
ICE 6th Edition	Institution of Civil Engineers, Standard Form of Contract, 6th Edition.
GC/WORKS/1	General Conditions of Government Contracts for Building and Civil Engineering Works.
GC/WORKS/2	General Conditions of Government Contracts for Building and Civil Engineering Minor Works.
FIDIC	Federation Internationale Des Ingenieurs-Conseils.
Model Form A	Model Form of General Conditions of Contract recommended by the IMechE, IEE and ACE for electrical and mechanical Works 'Home Contracts-With Erection'.
Model Form B3	Model Form of General Conditions of Contract recommended by the IMechE, IEE and ACE for electrical and mechanical Works 'Export Contracts-With Erection'.
Model Form MF/1	Model Form of General Conditions of Contract recommended by the IMechE, IEE and ACE for electrical and mechanical Works 'Home and Export Contracts'.
IMechE	Institution of Mechanical Engineers.
IEE	Institution of Electrical Engineers.
JCT	Joint Contracts Tribunal.
FCEC	Federation of Civil Engineering Contractors.
ACE	Association Of Consulting Engineers.
NFBTE	National Federation of Building Trades Employers.
FASS	Federation of Associations of Specialists and Subcontractors.
BPF	British Property Federation.
NEDO	National Economic Development Office.
CIRIA	The Construction Industry Research and Information Association.
NSC	Nominated Sub-Contractors.
ATI	Alternative Tendering Initiative.
DBFO	Design, Build, Finance and Operate Projects
PFI	Private Finance Initiative
EPSRC	Engineering and Physical Sciences Research Council.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND TO RESEARCH

The original concept of the innovative standard form of contract, the New Engineering Contract (1), was developed by Dr. Martin Barnes and Prof. John Perry and together they led the development through to the issue of a consultative version in 1991, the First Edition in March 1993 and a Second Edition in November 1995. An important anticipated benefit from NEC is a reduction in the incidence of disputes and the resource consumed at site level and above in resolving them. Policies of risk allocation were designed to help achieve this aim.

However, during the development of NEC several options for risk allocation were considered but not adopted. In some cases independent experts were consulted but conflicting advice was received. The issues were not easy and the solutions not obvious and the problems lay at the interface of management, law and insurance practices. The need for research was imminent to try and reconcile such conflicts. This research has aimed to analyse these different approaches or options in depth and to develop risk allocation option models which are robust for practical use.

The author of this thesis was originally awarded a scholarship equivalent to an EPSRC studentship by the School of Civil Engineering of the University of Birmingham to conduct the research. During the course of the research, the supervisor was awarded a three year EPSRC Grant to investigate the generic issues outlined below and the author was appointed to the post of Research Associate for this Grant.

As mentioned, the issues are at the interface of management, law and insurance practices. All the risks considered may be embraced by the umbrella of the contractor's responsibilities and liabilities under a contract. An introduction to the risk areas covered by this thesis is given below:

- Design liability;

One of the questions that arises in the construction industry concerning design liability is the question of which level of liability is preferable to the parties to engineering and construction contracts. The use of design liability limitation clauses attracts conflicting views between the parties. One of the main problems was that it was alleged by legal advisors that the term 'fitness for purpose' lacked precise definition in the English legal system. Another issue, which is relevant to Design and Build contracts and is linked to the first one, is when the liability is unlimited, what are the consequences of passing down this liability to professional designers who have design subcontracted to them by the contractor. The industry is not clear about the position of the law with regards to these issues (Chapter Three).

- Liability insurance;

Comments received during the development of NEC and early feedback from its use indicated the need for research which, on a wider front, would be relevant to the increasing use of Design and Build contracts. One problem is the extent to which insurance for 'fitness for purpose' liability is available and the conditions under which it may be offered (Chapter Four).

- Limitation of liability, force majeure and consequential losses;

Another issue which emerged during the course of this research is that of limitation of the contractor's liability financially particularly for 'force majeure' and 'consequential losses'. Some international contractors were not willing to tender for projects under the NEC without changes to the form of contract which would accommodate limitation of the contractor's liability for certain risk exposures. These included events totally outside the control of either party (force majeure) and 'consequential losses' (Chapters Five and Six).

- Insurance of subcontracted works;

Predominantly, there are two main options used in practice for insuring the work done by subcontractors. The first is blanket insurance by the main contractor and the second is blanket insurance by the main contractor in addition to subcontractor responsibility for insuring his own works. Both have advocates whose claims for the benefits and drawbacks of each approach were in conflict (Chapter Seven).

- Ground risk allocation;

Ground risks have, for many years, been a source of major problems and a source of conflicts on projects. In many instances, the risk leads to increases in the cost and duration of projects. The problem is amplified by the difficulty of finding precise wording in standard forms of contract that clearly defines the risk allocation boundary. This has led to a considerably high level of conflicts and disputes between the parties to contracts, at site level and above (Chapter Eight).

The basis and the need for the research on these subjects is briefly outlined by Perry et al 1992 (2). They identify the need for constructive and flexible approaches to the legal and insurance aspects of contracts. Reasons outlined included;

“-the desire and need of many clients to reduce the wastage of resources caused by disputes (from site level upwards to the courts)

-the need for more efficient management of construction contracts which is impacted by many factors, one of which is the avoidance of administrative, legal and insurance procedures which are unnecessarily costly in time and money.”

The underlying hypothesis for this research is that within the construction industry, some risks are allocated in a way which might not optimise the benefits to the parties involved.

In essence, this could be generating more disputes at site level and above in construction contracts, due to the conflicting views surrounding them. There could be much improvement in the way they are allocated for the ultimate reduction in the incidence of disputes and therefore in the construction cases that eventually need arbitration or, possibly, litigation. In turn, this leads to increased productivity of construction and greater value for money for the clients of the industry.

In practice, there are many factors which influence the risk allocation option models currently adopted. In this thesis, the author provides a thorough investigation of the option models adopted, the factors that are influencing their adoption and an in depth analysis for future improvement. He also attempts to show the hypothetical impact of option models which are not adopted and whether they could provide the improvement needed towards the main objectives which are a reduction in the incidence of disputes and greater productivity of the industry.

Risk allocations are mostly implemented through relevant conditions or clauses within forms of contracts between the client and contractor, the contractor and subcontractor, or within the contract between the client and his designer. Other risk transfer routes include insurance contracts and contracts of professional indemnities.

Risk allocations are based on certain principles even though these principles are not based on a robust theory. However, these principles underpin the different models of risk allocation. The research seeks to identify those principles which are not always self-evident or well understood.

1.2 RESEARCH METHODOLOGY

On the one hand we have the “well established” rationalistic scientific process described by Wright et al (3) and mentioned by Mulekezi (4) which offers a broad procedure for conducting research. It basically consists of;

- a) Identifying the problem and gathering data with the hope of resolving the problem (analysis).
- b) Postulating a tentative hypothesis as an aid to resolving the problem.
- c) Empirically testing the hypothesis by processing and interpreting the data to see if the interpretation will ultimately resolve the primary question (synthesis).
- d) Attempting to destroy the hypothesis by establishing a null-hypothesis (antithesis).

On the other hand, we have the iterative interpretative approach described by Seymour et al (5) who state;

“ In the positivist tradition it is assumed that social and cultural phenomena can be objectively described in the same way that the natural sciences have succeeded in providing an account of the physical world. In contrast, the interpretative tradition asserts that an adequate explanation of socio-cultural phenomena must take into account the use made by the social scientist of his membership of human society, and that therefore objectivity in the natural scientist’s sense is not possible.”

At no point has the author attempted to study the merits and demerits of each and this subject is beyond the scope of this thesis. However, the nature of the author’s research fields, namely project and construction management, construction law and insurance dictated to the author the need to study to some extent the different approaches, and to be aware of the limitations and drawbacks of each.

Approaching the research from a science-based discipline, from the outset of the research, the author has sought to follow the rationalistic scientific approach. At that stage, the author attempted to postulate tentative ‘hypotheses’ for each of the research areas based on the definitions of a ‘hypothesis’ by Good et al (6);

“ A hypothesis is a shrewd guess or inference that is formulated and provisionally adopted to explain observed facts or conditions and to guide in further investigation.”

and by Collins dictionary (7);

“ A hypothesis is an idea which is suggested as a possible explanation for a particular situation or condition, but which has not yet been proved to be correct.”

Indeed, for some of the risk areas, the original hypothesis remained until the end of the research, for example, the hypothesis constructed for insurance of subcontracted works (see Chapter 7). However, due to the initial inexperience of the author, the strategy was changed in many areas to one of ‘knowing the extent of the problem’ without a clear ‘hypothesis’ or research statement. That, of course, brought the author closer to the paradigm of the ‘interpretative’ approach. However, the author did not want to fully abandon the scientific approach. To that extent the methodology adopted was a mixture of the two approaches to research. Some may argue that this is not possible or practicable. However, the author has found that by giving pre-eminence to the scientific process, it was still possible to take into account the interpretative process in the way the data was gathered and analysed.

In this area, unlike other science disciplines, the data gathering involves study of industry practice and this is conducted mainly through interviewing experts and practitioners in the relevant fields. Because of the nature of the data sources, the research had to be conducted using the iterative interpretative approach (rather than the positivistic approach) described by Seymour et al (5).

Research of this type yields many conflicting views and different interpretations which are driven by differing motives and interests and are also dependant on social and cultural differences. The researcher has to distinguish between facts and opinions and take into account other factors such as background and personal experience of the interviewees. The approach outlined above provides a broad framework for the researcher to conduct the research and has been adopted by the author.

The technical inexperience of the author has helped initial bias in his findings. However, as more research was conducted the researcher was able to reach what is termed as 'informed neutrality'. That neutrality helped the author to assess the different opinions under a different light. Whereas initially, the author may have taken statements as facts, a stage was reached during the research where statements were questioned, taking into account all the influencing factors that the iterative interpretative approach recognizes.

On a more detailed note, the methodology for interviewing followed a pattern close to the one outlined by Perry (8), where the nature of the discussion topic and the discussion objectives were declared at the time of arranging the interview. In all cases the author attempted to guide the discussion by using a short list of pre-prepared questions. The interview data reveals that some interviewees would cover issues very early during the interview which were intended to be covered in forthcoming questions. Under those circumstances, the author allowed the interviewee to complete his answers but might ask for more elaboration on specific points if he felt that the issue at hand was not adequately covered. The author introduces the appendices of this thesis by provision of further elaboration on the methodology of conducting his interviews and structuring his industry survey questionnaires.

Due to the initial technical inexperience of the author, the early interviews tended to cover mostly factual information to determine the 'what' questions while subsequent interviews tended to cover the more analytical opinionatic 'why' questions. The author has tended to transcribe all the interviews. This is because he has always been aware that this data is of the nature of being 'through the eyes of those involved' only. Limitations would therefore be inherent due to the differing intents, motives, experiences, awareness, knowledge, and even the mood of the parties. All the interview transcripts are included in Appendix A.

The research also included trawling the database of comments made by different experts and practitioners during the drafting of the NEC. This has proved to be an invaluable source of information as it showed many of the conflicting views about the different risk

allocation option models and it partially served as a basis for the construction of the interview questions. The database of comments has also been an invaluable source of knowledge for the author.

The overall process for the research has been as follows;

- a. Literature review: gathering as much information as possible on all the topics concerned, thereby providing a sound theoretical background for pursuing the research.
- b. Identifying problems: attempting to identify the exact nature of the problems that face the industry which relate to the risk issues listed in Section 1.1.
- c. Hypotheses: establishing a hypothesis for each of the problems identified.
- d. Data gathering: gathering as much data as possible, enabling initial development of the alternative models of each specific issue.
- e. Analysis: analysing the data gathered to enable refinement of the models and progressing them towards robustness for practical use.

Strictly speaking, the process outlined above has not been sequential and has, in fact, involved considerable 'iteration' between the phases. During the course of the research, there was considerable refinement to the detail of the subject areas, in particular when stage (e) was reached.

In addition to the issues outlined in Section 1.1, the author also conducted research in other areas some of which were required under the EPSRC Grant, which continues until the end of 1997. This work has not been included in this thesis either because it is incomplete or because of time and length restrictions of the Ph.D. These areas included;

- Investigation of the possibility of offloading the 'security' risk to contractors.

- Investigation of the possibility of shifting the responsibility and liability for coordinating the work of utilities and others to contractors.
- Implications of the contractor being liable for a duty to warn of design defects performed by others.
- The implications of the use of the compensation events procedure in NEC in practice.

The author also excluded from this thesis similar research conducted in the Republic of the Sudan. After the grant has been awarded in 1994, the author was required to leave England for a period of three months during which he conducted this research.

1.3 THESIS STRUCTURE

The thesis is structured to present each of the research areas independently (Chapters Three to Eight). The author starts his thesis by an introduction to a general literature review which is relevant to all subject areas (Chapter Two). However, the author also outlines literature which he regards as more specific to each subject area in Chapters Three to Eight. These Chapters include their own analysis, discussions, and conclusions. Finally, in Chapter Nine, the author presents his overall conclusions.

CHAPTER TWO: LITERATURE REVIEW

2.1 INTRODUCTION

The subject areas for this thesis are various and therefore it is practicable to provide only a limited general literature review rather than an exhaustive one. Some of key principles identified by other authors in the field of project management practice, law and insurance are discussed.

Sections 2.2 to 2.4 of this Chapter, provide a review of general information about the relevant subject areas. Despite the fact that some of this is well known, the author is inclined to include it as it helps to develop a deeper and more thorough understanding of the issues discussed later. It starts by covering general principles of project risk management and risk allocation (Section 2.2). This is followed by a general view of relevant construction law, which also features the general principles of contract and tort (Section 2.3). Finally, Section 2.4 discusses insurance and the set of rules and laws that have been developed to govern it.

2.2 PROJECT RISK MANAGEMENT

2.2.1 RISK MANAGEMENT

Various authors, including Bussey (9) and Merrett et al (10) have defined the term 'risk' and some have distinguished it from terms such as uncertainty, hazard, and accident. Amongst the most recent are Warner (11) and Blockley (12). Warner 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.”

Blockley limits the definition of risk by stating that it is defined as,

“ the combined effect of the chances of occurrence of an accident and its consequences in a given context.”

Greene et al (13) define it as;

“ Risk is defined as the uncertainty as to the occurrence of an event.”

and previously in 1971, Williams et al (14) defined the term as;

“ Risk is defined as the variation in the possible outcomes that exists in nature in a given situation.”

The author outlines some of the general risk definitions to show how he thinks about the term risk and for the reader to be acquainted with it. However, the author does not feel that it is for the purposes of this thesis to provide further distinctions between the different terms, i.e., risk, uncertainty, hazard and accident even though, there has been an extensive debate over the distinctions between those terms. In fact, Perry et al 1985 (15) state that in the practice of construction risk management such distinctions are usually unnecessary and may even be unhelpful. The research is aimed at risk allocations rather than the basic definitions of the various terms. The risks being considered are being studied from the viewpoint that the underlying problems (uncertainty, hazard, etc..) may or may not occur and if they do, the outcome is not measurable in advance.

Warner (11) also defines the term ‘risk management’ as,

“ The overall subject area concerned with hazard identification, risk analysis, risk criteria and risk acceptability.”

He also states that 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.

Previously, Williams et al (14) also defined risk management as,

“ Risk management may be defined as the minimization of the adverse effects of risk at minimum cost through its identification, measurement and control.”

From recent literature prepared on the subject by Norris et al (16) which was a review of earlier publications and of use in practice, it has been established that;

“ i. Risk Management involves;

- a. identifying preventive measures to avoid a risk or to reduce its effect.
- b. establishing contingency plans to deal with risks if they should occur.
- c. initiating further investigations to reduce uncertainty through better information.
- d. considering risk transfer to insurers.
- e. considering risk allocation in contracts.
- f. setting contingencies in cost estimates, float in programmes and tolerances or 'space' in performance specifications.

ii. The benefits of using Project Risk Management are:

- a. an increased understanding of the project, which in turn leads to the formulation of more realistic plans, in terms of both cost estimates and timescales.
- b. an increased understanding of the risks in a project and their possible impact, which can lead to the minimisation of risks for a party and/or the allocation of risks to the party best able to handle them.
- c. an understanding of how risks in a project can lead to the use of a more suitable type of contract.
- d. an independent view of the project risks which can help to justify decisions and enable more efficient and effective management of the risks.
- e. a knowledge of the risks in a project which allows assessment of contingencies that actually reflect the risks and which also tend to discourage the acceptance of financially unsound projects.
- f. a contribution to the build-up of statistical information of historical risks that will assist in better modelling of future projects.
- g. facilitation of greater, but more rational, risk taking, thus increasing the benefits that can be gained from risk taking.
- h. assistance in the distinction between good luck and good management and bad luck and bad management.”

Perry et al 1985 (15) also outlined some of the features of the management response to construction risks, which can be briefly listed as four main headings:

- “- Avoidance,
 - Reduction,
 - Transfer which has the following routes;
 - a. Client to contractor or designer.
 - b. Contractor to subcontractor.
 - c. Client, contractor, subcontractor or designer to insurer.
 - d. Contractor or subcontractor to surety.
- The essential characteristic of the transfer response is that the consequences of the risks, if they occur, are shared with or totally carried by a party other than the client.
- Retention.”

Greene et al (13) define risk management as;

“ the function of executive leadership in the handling of specified risks facing the business enterprise.

There are three concepts of risk management: broad view, narrow view and intermediate view. In the broad view the risk manager is seen as an entrepreneur who owns and controls the enterprise and receives the profit or suffers loss, presumably for assumption of business risk. In the narrow view the risk manager's functions are confined to handling insurable risk, mainly through commercial insurance. The risk manager is the insurance buyer. In the intermediate view the risk manager's functions go beyond merely buying insurance for the firm, but they do not extend to the responsibility of the entrepreneur for total risk assumption or management.

The ways of handling risk may be grouped under the following headings:

1. Assuming the risk (risk retention).
2. Combining the objects subject to risk into a large enough group to enable accurate prediction of loss (this method includes the insurance mechanism).
3. Transferring or shifting the risk to some other individual.
4. Utilizing loss-control activities.
5. Avoidance of the risk.

Risk assumption (also called risk retention) is perhaps the most widely used of all ways to handle risk. Risk retention may be planned or unplanned. Planned risk retention, often called self-insurance, is conscious and deliberate assumption of recognized risk. The individual or firm decides to pay losses out of currently available funds.”

2.2.2 RISK ALLOCATION

The concept of risk allocation lies within the overall framework of risk management. The transfer routes suggested by Perry et al (15) and retention are both forms of risk allocation. Risk allocation by transfer route (a) is usually implemented through relevant conditions or clauses within forms of contract between the client and contractor or by the contract between the client and his designer. If the client or contractor wishes to transfer the risk to insurers, this is usually done by conditions in a contract of insurance between the party and his insurer. Professional designers transfer the risk through a professional indemnity policy which is the contract between the professional designer and his insurer. Contractors transfer the risk through a Contractor’s All Risks policy (see Section 2.4.3 for further detail).

2.2.3 PRINCIPLES OF RISK ALLOCATION

Abrahamson 1973 (17) was among the first to outline principles which should be used in allocating any type of risk. He was followed by several other authors including Barnes 1983 (18), Perry et al 1985 (15) and Perry et al 1992 (2). Abrahamson stated that a party should bear a construction risk where,

- a) It is in his control i.e. if it comes about it will be due to wilful misconduct or lack of reasonable efficiency or care.
- b) He can transfer the risk by insurance and allow for the premium in settling his charges to the other party (or to his other customers) or spread it directly in his prices, and it is most economically beneficial and practicable for the risk to be dealt with in that way.
- c) The preponderant economic benefit of running the risk accrues to him.
- d) To place the risk on him is in the interests of efficiency (which includes planning, incentive, innovation) and the long term health of the construction industry on which that depends.

- e) If, when the risk eventuates, the loss happens to fall on him in the first instance and there is no reason under any of the above headings to transfer the loss to another, or it is impracticable to do so.

Abrahamson stated that the job of balancing these five principles in practice is the hard one. But at least it is best to work from declared principles rather than undeclared and perhaps unconscious prejudices.

Barnes (18) has set up a risk allocation algorithm which included identifying the risks that are predominantly outside the contractor's control and allocating those to the client. The algorithm suggested by Barnes is based on several factors. He stated that one of the factors in setting up risk allocation principles is the attitude of the parties to risk itself. The risk-averse person is one who will pay to avoid risk. The person who welcomes risk is typified by a gambler. He is prepared to pay a premium in the form of the bookmaker's commission in exchange for the pleasure of taking a risk that he is not even obliged to face. The risk-neutral person is neither risk-averse nor does he welcome risk. Barnes stated that Erikson (19) has deduced that construction contractors are risk-averse. He also stated that Porter (20) concluded that clients are risk neutral. His conclusion was that it follows that the best policy for lowest cost construction is for the risks to be carried by the client. He saves money by not having to pay the premium that the risk-averse contractor would wish to charge. On the other hand, Chapman et al 1989 (21) state that contractual parties are assumed to be rational, risk averse decision makers in the classic decision analysis sense. Chapman et al also state that this implies the following behaviour for clients when making an independent choice between alternative ways to achieve completion of a given project;

- a) They are prepared to take risk, but they are not prepared to take an additional amount of risk without a decrease in expected cost.
- b) They will always seek the lowest expected cost for any given level of risk, or the lowest level of risk for any given expected cost.
- c) They will seek an optimal tradeoff between risk and expected cost.

Chapman et al also stated that reciprocal assumptions apply to contractors in terms of their profit.

In a similar manner to Abrahamson, Perry et al 1985 (15) stated that the factors to be included for risk allocation are;

- a) the party which can best control the events which may lead to the risk occurring.
- b) the party which can best control the risk if it occurs.
- c) whether or not it is preferable for the client to retain an involvement in the control of the risk.
- d) the party to carry the risk if it cannot be controlled.
- e) whether the premium to be charged by the party to which the risk is allocated is likely to be reasonable and acceptable.
- f) whether this party is likely to be able to sustain the consequences if the risk occurs.
- g) whether, if the risk is transferred, it leads to the possibility of risks of a different nature being transferred back to the client.

Perry et al (2) modified the above principles and outlined;

- a) risks should be allocated to the party most able to control them.
- b) risks which are outside the contractor's control should usually be allocated to the employer.
- c) risks should not be allocated to a party who may be unable to sustain the consequences if the risk occurs.
- d) risk allocation should encourage good management by the party who carries the risk.
- e) the party who is not carrying the risk should be motivated to manage the consequences of the occurrence of the risk in an effective and equitable way.
- f) where the impact of a risk is small (either in terms of its size relative to other risks or in terms of the parties ability to sustain the consequences of its occurrence) the parties tend to become indifferent about the way it is allocated.

Perry et al 1992 (2) also stated that as understanding of risk increases further development of these principles can be expected.

Perry (8) stated that the prime aim is to allocate all risks between client and contractor and that this should be based on a proper identification and assessment of their

implications and must take account of the management and control of the effects of risks which materialise.

Several, if not all, of the principles outlined by the different authors are not based on a robust theory. In fact, as will be shown later in Section 8.9, the Scottish Office experimented by defying many of them by the concept of offloading risk to the contractor. The author has tried to adopt Abrahamson's principle of '*working from declared principles rather than undeclared and perhaps unconscious prejudices*' in developing the models.

2.3 CONSTRUCTION LAW

2.3.1 CATEGORIES OF LAW

It is thought that the thesis would mainly be read by people trained in engineering rather than law, so a brief outline of the English law system would help understand of many of the principles relevant to legal issues.

Several authors outline general literature about the English law, the law of contract and tort and how that affects construction law. The following has been extracted from Uff (22) as the author thinks that it provides a thorough picture about the law in general and how it affects the construction industry and its law.

English law may be categorised in a number of ways. It may be divided into what is called substantive law and procedure. Substantive law refers to all the branches of law which define person's rights and duties, such as contract, tort and crime. Procedure deals with the often complex rules through which the process of law is set in motion to enforce some substantive right or remedy. Procedure properly arises only when there is resort to legal action, but nevertheless it can be as important in practice as the substantive law. In the context of construction disputes, procedure includes arbitration, which has its own procedural rules.

A further division of law is into common law and statute law; that is, into judge-made law and legislation. Then there is another type of division between common law (used in a rather different sense) and equity, which is a distinction based upon the two great independent roots of English law.

2.3.1.1 THE COMMON LAW

English law is based upon the common law system. The common law means literally the law which was applied in common over all parts of the realm. The essential feature of the common law which distinguishes it from other systems, is that it is based entirely on evolving precedent stems.

2.3.1.2 STATUTE LAW

While the judges declare and apply the common law, Parliament in its legislative capacity passes enactments to change the law. Since the seventeenth century Parliament has had supreme authority so that in theory it can make or unmake any law. The passing of a Bill through Parliament and the argument at different stages in its passage can be followed in the news media. The end result is an officially printed document which states, in the words chosen by Parliament, the law on some topic or group of topics. Once enacted, and in force, the words of the statute are themselves law.

2.3.1.3 EQUITY

In the division between common law and equity, each branch comprises both judge-made law (found in case reports) and statute law. The difference arises because, before 1873, when the systems began to be jointly administered, there were two separate legal systems. They operated in different courts. Equity was applied in the Old Court of Chancery, which is still to be found in Lincoln's Inn. The differences between law and equity are still of importance. One essential distinction is that a common law remedy is a right, whereas

a remedy in equity is, theoretically, discretionary. It depends on the justice of the cause. The distinction may be illustrated by the consequences of a breach of contract. The common law remedy is damages. These will be awarded, however unjustly the plaintiff has acted, and whether or not damages will make good the loss suffered. Alternatively, in equity the plaintiff can ask for the remedy of specific performance, that is, that the defendant be compelled to fulfil his obligation. But this will be available only under certain conditions, *inter alia*¹, that the plaintiff has acted fairly, that he has not delayed in seeking his remedy, and that damages would not adequately compensate him.

2.4 INSURANCE

2.4.1 GENERAL

2.4.1.1 DEFINITION

Dinsdale et al (23) state that insurance is a device for the handling of some of the risks - or chances of loss- to which man is subject. It is also a device for the transfer of risks of individual entities to an Insurer, who agrees, for a consideration (called the premium), to assume to a specified extent losses suffered by the Insured.

Greene et al (13) state that insurance may be defined in two different contexts: as an economic or social institution designed to perform certain functions, and as a legal contract between two parties. Insurance is an economic institution that reduces risk by combining under one management a group of objects so situated that the aggregate accidental losses to which the group is subject become predictable within narrow limits.

2.4.1.2 HISTORY

Birds (24) states that the origins of the modern insurance contract are to be found in the practices adopted by Italian merchants from the fourteenth century onwards, although

¹ among other things

there is little doubt that the concept of insuring was known long before then. Maritime risks, the risk of losing ships and cargoes at sea, instigated the practice of medieval insurance and dominated insurance for many years. The habit spread to London merchants but not, it appears, until the sixteenth century. At first, there were no separate insurers. A group of merchants would agree to bear the risks to each other among themselves.

2.4.1.3 FIRST AND THIRD PARTY INSURANCE

Birds (24) also states that one can distinguish first party insurance, under which one insures one's own life, house, factory or car etc., from third party or liability insurance, that is insuring against one's potential liability in law to pay damages to another. Of course, first and third party aspects may well be combined in the same policy. The English law reflects this difference, first by demanding that some third party insurances should be compulsory and secondly by recognising that in practice, third party insurance involves the third party as much as the insured person. Often in practice, for example, the victim of a car accident may talk in terms of claiming from the negligent driver's insurer rather than from the driver, which in law is the correct way of expressing the position.

2.4.2 INSURANCE LAW

2.4.2.1 THE LEGAL DEFINITION OF INSURANCE

From Birds (24), we also find that the statutes dealing with the regulation of insurance business, of which the Insurance Companies Act 1982 is the current one, have never contained a definition, no doubt because of the risk of inadvertently excluding contracts which should be within their scope. Apart from the desirability of defining the scope of what the law of insurance applies to, clearly the fundamental reason for any attempt to define the meaning of an insurance contract is because the business of providing insurance under contracts of insurance is closely regulated.

Birds also states that it is suggested that a contract of insurance is any contract whereby one party assumes the risk of an uncertain event, which is not within his control, happening at a future time, in which event the other party has an interest, and under which contract the first party is bound to pay money or provide its equivalent if the uncertain event occurs. It would follow that anyone who regularly enters into such contracts as the party bearing the risks is carrying an insurance business for the purposes of the statute regulating insurance business.

2.4.2.2 BASIC LEGAL PRINCIPLES OF INSURANCE

Several authors such as Clarke (25) provide the principles of insurance law. From Birds, we can find that the contract of insurance is basically governed by the rules which form part of the general law of contract, but there is equally no doubt that over the years it has attracted many principles of its own.

Birds also states several aspects of the legal principles of insurance;

i. Legal entitlement

First, there must clearly be a binding contract, and the insurer must be legally bound to compensate the other party. A right to be considered for a benefit which is truly only discretionary is not enough.

ii. Uncertainty

The uncertainty which is a necessary feature of insurance is in most cases as to whether or not the event insured against will occur.

iii. Insurable Interest

The other party, the insured, must have an insurable interest in the property or life or liability which is the subject of the insurance.

iv. Control

It seems essential that the event insured against be outside the control of the party assuming the risk.

v. Provision of money's worth

There seems no reason in principle why it should be necessary for the insurer to have to undertake to pay money on the occurrence of the uncertain event, although this was the view taken by some of the leading authors such as Chitty (26). In any event, there is now clear authority that the provision of something other than money is enough, provided that it is of money's worth.

vi. Other requirements

Certain authorities suggest, however, that the above definition may not be sufficiently comprehensive. *Hampton v Toxteth Co-operative Society* (1915) and *Hall D'Ath v British Provident Association* (1932) both appear to suggest that there can be no insurance business carried on in the absence of a clearly stipulated premium and policy.

On the same subject of the legal principles of insurance, Dinsdale et al (23) state that insurance can only cater for risks when the following features are present:

- a. There must be sufficient number of risks of a similar class being insured so as to produce an average of loss experience.
- b. It must be possible to calculate the chance of loss.
- c. The occurrence of loss must be fortuitous.
- d. There must be an insurable interest to protect.
- e. The possible loss must not be catastrophic.

Several authors such as Diamond et al (27) and Dinsdale (28) stress the importance of *utmost good faith* in insurance contracts by stating that the facts relating to a proposed insurance are usually known to one party only, the proposer. However wide the experience of the insurers they must, in underwriting, to a large extent rely on the information disclosed by the proposer. The proposer, on the other hand, is entitled to be

fully informed of the terms and conditions of the policy which the insurers are prepared to issue.

2.4.3 INSURANCE IN CONSTRUCTION PROJECTS

Keeling (29) states that losses within a construction project could be to the contractor, subcontractor, supplier or a loss suffered by the employer or some other party who may be outside any contractual relationship with those involved with construction.

The parties directly involved with construction contracts are;

- a. Employer and his bank or financial institution.
- b. Architects, Consulting Engineers, Quantity Surveyors and the Solicitors retained.
- c. Contractors and the material suppliers.

Concerning the main contractor, he would need to insure the permanent works, temporary works, his plant and equipment, injury, loss of or damage to third party or property and his employees and any labour only subcontractors.

The subcontractors can suffer losses in any of the following ways;

- their parts of the works.
- their plant and equipment.
- injury, loss or damage to third party.
- injury or death of employees.

A brief outline of the different policies involved in construction:

- a) Construction All Risks - The Works, Temporary Works, Constructional Plant and Equipment.
- b) Public Liability - Injury, Property damage, Economic Loss, Product Liability.

- c) Employer's Liability - Injury to Employees and to Labour Only Subcontractors.
- d) Professional Indemnity - Economic Loss, Property Damage and Injury.

These insurances will come into operation to respond to the loss suffered by the 'insured' or those losses for which he is held 'responsible' under the contract or in respect of general liability to the public etc. The Professional Indemnity Policy will apply to a Consultant and for the design and build contractor.

On the subject of insurance in construction projects, Uff (22) states that there are a variety of provisions and practices in construction work which usually result in there being a considerable variety of policies applying to different aspects of the work, covering different parties and providing different types of cover. Some of these are compulsory, being required by conditions of contract, while others are discretionary and taken out for the protection of individual parties. The result is often that, when a loss occurs, the disputes between the parties turns into a dispute between those who have insured the parties against their loss or liability. This can have the unintended effect that the parties effectively lose control of the dispute, and the decision whether to fight or settle is that of the insurers.

Uff (22) also states that construction contract forms invariably make a number of express requirements for insurance. In general, construction contracts require two different types of cover. First, insurance is required on the works themselves. This is often a policy which is to be taken out in joint names (of the contractor and the employer) but the terms and the risks to be insured, depend on the wording of the particular policy. The other, separate type of cover, is insurance against third party claims. This is a quite different type of cover in that insurance of the works is insurance of 'property'. Third party insurance is against liability. One of the reasons for the difference in these two types of cover is that, while the contractor (and the employer) have an insurable interest in the works, they have no such interest in third party property other than through their potential liability for damage to it.

Uff (22) also states that in addition to these policies, contractors invariably maintain a continuing policy covering a variety of matters, called a Contractors' All Risks (C.A.R.) Policy. The type of cover provided tends to vary, but a C.A.R. policy typically provides some cover against liability for design work, and to some extent, against defects in material or workmanship.

The other major insurance cover under construction projects, is the professional indemnity (PI) cover taken out by engineers and architects. These are continuing annual policies which cover the professional against legal liability, which will usually arise through negligence.

Table 1 outlines the different insurance provisions along with the different types of policies that cover them;

To be covered by insurance	Policy
Main Contractors Works (Permanent, Temporary)	C.A.R.
Subcontracted Works (Permanent, Temporary)	Either C.A.R. only or C.A.R. and subcontractor's C.A.R.
Main Contractor's plant, material, equipment (on site, off site)	C.A.R.
Subcontractor's plant, material, equipment (on site, off site)	Subcontractor's C.A.R.
Main Contractor's employees	Main contractor's employer's liability policy
Labour Only Subcontractors	
Subcontractor's employees	Subcontractor's employer's liability policy
Reasonable skill and care	Professional indemnity
Third Party liability (Main Contractor)	Main contractor's third party liability policy
Third Party liability (Subcontractor)	Subcontractor's third party liability policy

Table 1: Types of Insurance Provisions and the Policies Available

CHAPTER THREE: DESIGN LIABILITY

3.1 INTRODUCTION

In this Chapter, the author describes his research into the subject of design liability of contractors and professional designers in the construction industry.

Initial research conducted by the author into the database of comments compiled during drafting of the NEC has suggested that there may be several issues concerning liability for design that may be in need of more rigorous research. One of the questions that arises in the construction industry concerning design liability is the question of which level of liability is preferable to the parties to engineering and construction contracts. The choice is perceived to be between the 'fitness for purpose' liability and the 'reasonable skill and care' liability. One of the main problems seemed to be that it was alleged by legal advisors that the term 'fitness for purpose' lacked precise definition in the English legal system. Therefore, NEC did not include the term adopting the notion that it will be defined by the Works Information. The author, therefore, conducted research in this area to establish the precision of these allegations and the robustness of the Model adopted by NEC.

A related problem is that by the English law, professional designers are liable in their design for 'reasonable skill and care' whereas contractors are liable for 'fitness for purpose'. However, some standard engineering contracts attempt to limit contractors liability to 'reasonable skill and care'. The implications of adopting this policy were also investigated and the findings presented in this Chapter.

Another issue which is also related to the above is that within design and build contracts, contractors might 'subcontract' part or the whole of their design to a professional designer. However, a contractor and a professional designer may have different levels of liability, the contractor being exposed to 'fitness for purpose' and the designer to

'reasonable skill and care'. The author has also conducted research on the implications of having these different levels of liabilities.

Initially, the author outlines literature on the laws of Tort and Contract. This is then followed by the design obligations requirements in both Tort and Contract. The author also presents cases which highlight the problem of transfer of the level of liability to professional designers. Following the literature, the author includes his research on liability limitation in practice and the liability limitation clauses in standard forms of contract and that is then followed by a presentation of different option models. Finally, the author outlines his conclusions and recommendations.

3.2 HYPOTHESES

The research on this chapter is based upon the following hypotheses. These hypotheses have been constructed by the realisation of a potential problem for construction industrialists at an initial stage of the research but have been refined during the course of this research. Although the author does not have a legal background, it was necessary to gain an adequate level of understanding of relevant legal issues for more pragmatic recommendations. The main issue that was under investigation was the legal understanding of the terms 'fitness for purpose' and 'reasonable skill and care'. During the course of the research another problem has emerged. The distinction between the two levels of liability has not been clear, hence hypothesis (1) and hypothesis (2). By conducting more research on the models that are adopted by other standard forms of contract, the author started to realise that the model adopted by NEC for limiting the contractor's liability for design by Secondary Clause M, and the lack of the term 'fitness for purpose' in the contract, may be the most appropriate for the need of the construction industry in the U.K., hence hypothesis (3).

1. Case law for both contract and tort does not provide a clear statement which defines the term 'fit for purpose', and the distinction between the two levels of liabilities, 'fitness for purpose' and 'reasonable skill and care' is not explicit.

2. For design and build contracts, the extent of the design liability of a professional designer for his subcontracted design (from the contractor) may not be 'reasonable skill and care' if the contractor's liability is 'fitness for purpose'.

3. The Model of the NEC for limiting the contractor's liability to 'reasonable skill and care' may be the most appropriate for the need of the construction industry in the UK.

3.3 LITERATURE REVIEW

3.3.1 INTRODUCTION

In Chapter Two the author outlined a general view of the principles of the English law and the common law. This section will be more specific towards design liability. However, before introducing the issue of liability for design, the author outlines some important distinctions between the law of tort and the law of contract.

3.3.2 TORT AND CONTRACT

We can see that liability for construction, and hence design, has been in existence for a considerable amount of time in history. Bunni² (30) shows that it was in the Middle East where the earliest available recorded rules of codified construction law were discovered. It was in Mesopotamia, in 1760 BC, where King Hammurabi, the sixth and best known king of Babylon's first dynasty, codified the liability of contractors. Articles 229 to 233 of that code provided as follows;

"229 If a builder builds a house for a man and does not make its construction firm and the house which he has built collapses and causes the death of the owner of the house that builder shall be put to death.

230 If it causes the death of the son of the owner of the house they shall put to death a son of that builder.

² Extracted by Bunni (30) from "Codigo de Hammurabi", Edicion preparada por Federico Lara Peinado, Editora Nacional, Madrid, 1982.

231 If it causes the death of a slave of the owner of the house he shall give to the owner of the house a slave of equal value.

232 If it destroys property, he shall restore whatever it destroyed, and because he did not make the house which he built firm and it collapsed, he shall rebuild the house which collapsed at his own expense.

233 If a builder builds a house for a man and does not make its construction meet the requirements and a wall falls in, that builder shall strengthen the wall at his own expense.”

At the present day, in the English law, the ‘punishment’ may not be as severe as in Articles 229 to 231 but the principle still remains the same and the ‘damages’ payable may be as in Articles 232 and 233. The party who holds the responsibility will still have to pay, even though it will be in the form of financial ‘damages’ rather than death. However, before defining the form of the ‘punishment’, there are two questions that have to be addressed in the present legal system for parties involved in building and construction. The first is whether the injured party can bring action against the defendant in contract or in ‘tort’, and the second is what level of liability would the defendant be held against? Before addressing these questions, it would be useful to look at what ‘tort’ is and how the issue may be addressed differently from contract. From Clerk et al (31) we find that many attempts to define a tort have been made, but none seems entirely satisfactory. Clerk et al go on to state that the definition given by Sir Percy Winfield runs,

“Tortious liability arises from the breach of a duty primarily fixed by the law; such duty is towards persons generally and its breach is redressible by an action for unliquidated damages.”

Clerk et al also state that,

“the law of tort protects a range of interests different from those protected by the law of contract. Failure to make the plaintiff’s position better, which arises mainly through the non-fulfilment of promises, is the concern of the law of contract. Making the plaintiff’s position worse, which arises mainly through physical damage to his person or property was always the concern of tort. Thus it came about that in the law of tort the development of liability was mainly for physical damage, which was wider than any tortious liability for non-physical damage, which was left to the law of contract.”

That, however, does not make the question whether a plaintiff can bring action against a defendant in tort or contract any easier. Clerk et al also state that there was always considerable overlap between tort and contract, which obscured their relationship. Along the same lines, Furmston (32) also stated that,

“traditionally contract lawyers and tort lawyers have taken little interest in the details of each other’s subjects but this aloofness can no longer be safely practised since over the last twenty years the area of overlap between tort and contract has significantly increased.”

Even though Clerk et al (31) also state that Sir Percy Winfield drew the distinction between tort and contract as follows,

“At the present day, tort and contract are distinguishable from one another in that the duties in the former are primarily fixed by law, while in the latter they are fixed by the parties themselves. Moreover, in tort the duty is towards persons generally, in contract it is towards a specific person or specific persons”.

Still, that distinction by Sir Percy Winfield does not provide much help to clearly identify and clarify the area of overlap between contract and tort because Clerk et al state,

“it seems clear that an architect or engineer who designs a house so dangerous that it actually injures the client or damages his property (other than the premises themselves) would be liable in tort. It is also clear that in this case, he would also be liable in contract. Less straightforward is the case where defective design causes merely economic loss to the client: where, for instance, work is necessary to put right defects, or where an office building is unusable and as a result the client loses profits. Here the architect is liable in contract; but is he also liable in tort? The existence in such cases of a concurrent duty in tort used to be very doubtful; Diplock L.J. denied that any such liability existed in *Bagot v. Stevens Scanlan* [1966] in 1964. However, it is submitted that *Bagot’s* case should now be treated as having been overtaken by subsequent developments. Oliver J. doubted its correctness in *Midland Bank v. Hett Stubbs and Kemp* [1979] when he held that solicitors could be liable to clients in tort; and in *Congregational Union v. Harriss & Harriss* [1988], the Court of Appeal and House of Lords respectively assumed that an architect could be liable to his client in tort for economic loss. Therefore, it is submitted, an architect is concurrently liable in contract and tort for economic loss suffered by his client.”

However, not all types of economic losses give rise to liability in tort. Stuart-Ranchev (33) mentions that 'loss' has a certain legal classification in tort. The following loss classifications are applied;

- i. personal injury.
- ii. physical damage "to other property" (i.e. other than the defective property itself)
- iii. financial loss directly connected with physical damage to "other property".
- iv. financial loss which is more "remotely" connected with physical damage to "other property".
- v. defects or damage to the property itself.
- vi. financial loss resulting from reliance on negligent advice.

In respect of i., ii., and iii., recovery will be allowed in the tort of negligence. In respect of iv., it will not. In respect of v., it will not unless there is some "special relationship". In respect of vi., it will be provided there is sufficient "proximity" between the parties.

All these losses would be recoverable in contract subject only to their "naturally flowing from the breach" of contract or being in the "contemplation of the parties" by reason of special knowledge at the time of the contract.

In summary, the principle features of contract and tort that may affect bringing a claim in either one of them were outlined by Stuart-Ranchev (33) as follows;

"For contract,

- Only the parties to it are entitled to the benefit of its terms.
- A contract affords the parties to it the opportunity to control the obligations and duties they undertake towards each other.
- The basic nature of contractual obligations depends on what you have undertaken to do (subject to implied terms).

- A breach of contract attracts liability for all the losses which naturally arise from such breach in the normal course and any losses which flow from special knowledge of the parties at the time of the contract.
- The period within which claims may be brought (the "limitation period") is 6 years (contracts "under hand") and 12 years (contracts under seal/executed as deeds) from the date of breach.
- Subcontracting will not relieve primary responsibility.

For tort,

- Gives rise to rights not only with parties with whom you have chosen to deal, but also with third parties and strangers.
- You do not control the nature of the obligations-you have to rely on the general operation of the law to do this.
- The nature of the obligation is in broad terms a duty to avoid harm (it is the definition of this duty which has particularly exercised the courts).
- A breach of duty gives rise to liability for limited types of loss-normally loss arising directly from personal injuries or physical damage, but sometimes wider.
- The period for bringing claims is 6 years from the date of damage, with a statutory extension (Latent Damage Act 1986) of 3 years from knowledge, with a 15 year long stop running from the date of breach, governing both the 6 year and 3 year periods.
- Subcontracting may relieve primary responsibility.”

One major difference between contract and tort appears to be limitation periods for latent defects. Uff (22) refers to limitation periods and states;

“ a claim must ordinarily be brought within the period of limitation. The effect of the limitation acts is to bar the remedy rather than the right of action. Accordingly, limitation will be relevant only if raised by the defendant in his defence. The present law of limitation is set out principally in the Limitation Act 1980, which provides that an action founded on simple contract must be brought within six years of the date on which the cause of action accrued and a claim upon a contract by deed within 12 years. In contract, the cause of action accrues on the date of the breach of contract. The fact that damage is suffered later does not give the plaintiff any further or other cause of action. In the case of a building contract, however, the date upon which a breach occurs may not be limited to the date upon which the acts complained of were carried out. For example, although defective work may create one cause³ of action when carried out, a further breach and a further cause of action may arise when a builder fails to

³ reason for taking legal action.

comply with an instruction to rectify the defects. The final date of breach may be as late as the end of the maintenance period. Thus, it is necessary to construe the contract and to consider the facts to ascertain the latest date upon which the plaintiff is entitled to commence proceedings.”

3.3.3 DESIGN LIABILITY OBLIGATIONS IN CONTRACT AND TORT

The second question which was posed earlier in Section 3.3.2 concerns the level of liability. On the broader subject of design responsibility, Stuart-Ranchev (33) addressed the issue by stating that it is a vast subject but can perhaps broadly be distilled into the following elements;

- a. Who may have the responsibility?
- b. To whom is it owed?
- c. How does it arise?
- d. What does it consist of?
- e. What liability does it give rise to?
- f. How long does the liability last?

For the purposes of this thesis, the main concern is question (e) even though the other questions raised are of relevance. The level of liability that design responsibility may give rise to may differ between contract and tort when it comes to the party holding the responsibility. It may differ between professional designers and contractors in tort and in contract.

Stuart-Ranchev (33) also states that in tort, the nature of the designer’s obligation is one to exercise ‘reasonable skill and care’ for both contractors and professional designers. In contract, however, the position in law differs to some extent between the professional designer and the contractor designer in respect of implied terms⁴. Stuart-Ranchev also mentions that in both cases, express provisions in the contract will affect the nature of the obligation. This is ascertained by Manson (34) who states that the use of exclusion and

⁴ Terms which the parties have not themselves seen fit to include expressly, and so as a general rule the courts will only imply terms that they feel the parties must, of necessity, have agreed to if they have thought about it.

limitation clauses in contracts for the sale of goods is permitted by Section 55 of the Sale of Goods Act 1979 which states,

“where a right, duty or liability would arise by implication of law under a contract of sale of goods it may be negated or varied by express agreement, or by the course of dealing between the parties, or by usage as binds the parties to the contract.”

However, the express provision will be subjected to the Unfair Contract Terms Act 1977.

Stuart-Ranchev (33) also states that generally, a professional designer’s liability in contract is to exercise ‘reasonable skill and care’. He is not taken to warrant that the result will be achieved (“strict liability⁵”). If the result is not achieved, but he has exercised ‘reasonable skill and care’, he will not be liable. In this area, another matter which is addressed by the law is the level of ‘skill and care’ required. Stuart-Ranchev states that whether ‘reasonable skill and care’ has been exercised is judged by reference to the ordinary level of competence of a designer operating in that particular field.

The generally accepted expression of the test appears in Bolam vs. Frien Hospital Management Committee (1957):

“The test is the standard of the ordinary skilled man exercising and professing to have that special skill.”

Several authors state the standard of care which is expected of the professional. For example Cannar (35) states that;

“it has long been established that where a relationship of client and professional advisor exists, it is an implied term of the contract between them that any advice given or work done should be reasonably competent.”

Eddy (36), Madge (37) and Jackson et al (38) state that the standard of care was originally expressed over 100 years ago in the case of Lanphier vs Philos (1838),

⁵ liability generated from action or inaction which are not necessarily fault-related or negligence-related.

“Every person who enters into a learned profession undertakes to bring to the exercise of it a reasonable degree of care and skill. He does not undertake, if he is an attorney, that at all events you shall gain your case nor does a surgeon undertake that he will perform a cure, nor does he undertake to use the highest possible degree of skill. There may be persons who have higher education and greater advantage than he has but he undertakes to bring a fair, reasonable and competent degree of skill.”

In *Badgley vs Dickson* (1886), a case involving an architect, it was expressed as an ordinary and reasonable degree of care and skill:

“As architect, he is in the same position as any other professional or skilled person, and whether it be the preparation of plans and specifications, or the doing of any other professional work for reward, is responsible if he omits to do it with an ordinary and reasonable degree of care and skill.”

However, an important question was raised by *Stuart-Ranchev* (33). Does the test differ for someone with greater skills than the ordinary man exercising that particular skill? In answer to this question she states,

“this question was considered in *George Wimpey & Co Limited v. D.V. Poole and others* (1984) where the judge held that the basic test is no different where the client deliberately selects and pays for someone with particularly high skills. This case concerned the curious scenario of a design and build contractor trying to persuade the Court that it had been negligent on the basis that its special expertise meant it owed a higher duty of care than ordinary competence. The reason was that Wimpey had carried out remedial works and were now claiming under their professional indemnity policy, for which they had to establish they were negligent. The judge however held himself bound to follow the *Bolam* test which had House of Lords approval (*Whitehouse v. Jordan* [1981]) and rejected that Wimpey had been negligent.”

A diagrammatic representation of the implication of this case and *Stuart-Ranchev*'s question is offered in Figure 1 below;

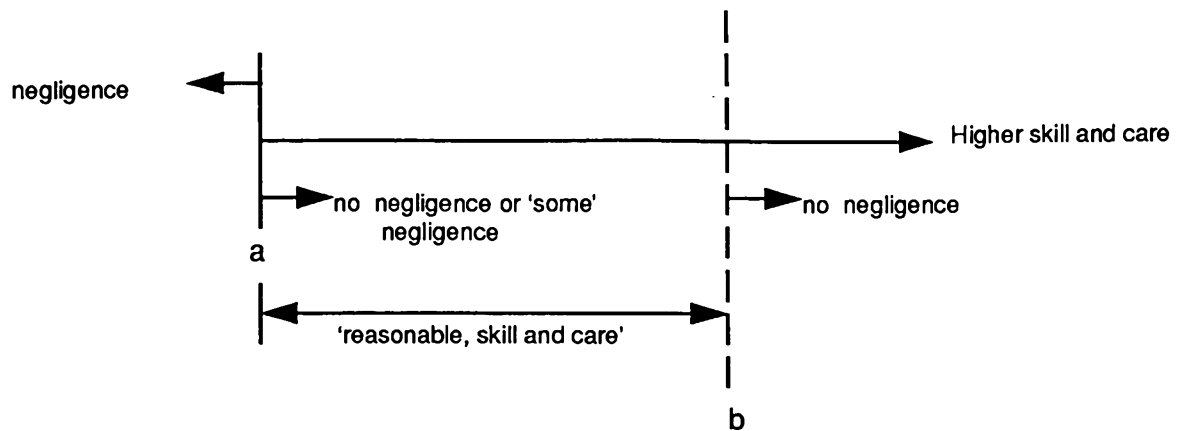


Figure 1: Liability Spectrum

If negligence can easily be established (boundary 'a' in Figure 1), then the courts can easily establish that 'reasonable skill and care' has not been exercised and therefore the responsible party will be held liable in contract and possibly in tort. However, as the case of Wimpey demonstrates, a 'no negligence' case may be established but with the result that a party may be considered, or may consider himself, negligent. Therefore, the real boundary between negligence and no negligence may be somewhere between 'a' and 'b' as shown in Figure 1. This demonstrates that within the construction industry, a spectrum is created around the level of liability of 'reasonable skill and care'. For professional designers, architects, contractors and professional indemnity insurers, boundary 'a' may be perceived as distinct without the knowledge that it can be established anywhere between 'a' and 'b'. Practical understanding by managers and engineers may be assisted by explicit statements on the notion that 'reasonable skill and care' is not distinct.

Jackson et al (38) also stated that the contractual duty to serve his client with 'reasonable care and skill' will, however, arise irrespective of whether the nature of the engagement is such as to make the architect the client's agent. The Supply of Goods and Services Act 1982 provides that such a duty is implied in a contract for the supply of a service where the supplier is acting in the course of a business.

This has also been previously mentioned by Stuart-Ranchev (33) and she has also stated that the contractor designer suffers risk by reference to statutory implied terms, under the Sale of Goods Act 1972 and the Supply of Goods and Services Act 1982, which will impose certain contractual warranties relating to merchantable quality and fitness for purpose irrespective of what the contract says (also see interview 3, p.3.1). The statutory implied terms give rise to risk for the designer contractor that a contract which is silent on the point will impose him to 'strict liability' for all the obligations he has undertaken, including his design obligation.

From Duncan Wallace (39) and Cornes (40), we find that it is submitted that a contractor undertaking to do work and supply materials impliedly⁶ undertakes,

a. to do the work undertaken with care and skill or, as sometimes expressed, in a workmanlike manner.

b. to use materials of good quality. In the case of materials described expressly this will mean good of their expressed kind. (In the case of goods not described, or not described in sufficient detail, it is submitted that there will be reliance on the contractor to that extent, and the warranty in (c) below will apply);

c. that both the work and materials will be reasonably fit for the purpose for which they are required, unless the circumstances of the contract are such as to exclude any such obligation (this obligation is additional to that in (a) and (b), and only becomes relevant, for practical purposes, if the contractor has fulfilled his obligations under (a) and (b)).

Duncan Wallace (39) goes on to explain that the first two obligations (a) and (b) correspond to the warranty of merchantability, and that under (c) to the warranty of suitability, under section 14 of the Sale of Goods Act 1873. The obligation under (c) is here called the 'design' obligation and extends, it is submitted, to all defects of planning or conception of the building or project in question including, as stated, the selection of all materials and work processes.

⁶ The courts will imply the term.

The reasons are outlined by Jackson et al (38) for the case of *Midland Bank Trust Co. Ltd. v. Hett, Stubbs and Kemp* (1979). Oliver J. pointed out the obligation to exercise 'reasonable skill and care' is not the only contractual term which ought to be considered in a professional negligence action,

"The classical formulation of the claim in this sort of case as 'damages for negligence and breach of professional duty' tends to be a mesmeric phrase. It concentrates attention on the implied obligation to devote to the client's business that reasonable care and skill to be expected from a normally competent and careful practitioner as if that obligation were not only a compendious, but also an exhaustive, definition of all the duties assumed under the contract created by the retainer and its acceptance. But, of course, it is not. A contract gives rise to a complex of rights and duties of which the duty to exercise 'reasonable care and skill' is but one.

If I employ a carpenter to supply and put up a good quality oak shelf for me, the acceptance by him of that employment involves the assumption of a number of contractual duties. He must supply wood of an adequate quality and it must be oak. He must fix the shelf. And he must carry out the fashioning and fixing with the reasonable care and skill which I am entitled to expect of a skilled craftsman. If he fixes the brackets but fails to supply the shelf or if he supplies and fixes a shelf of unseasoned pine, my complaint against him is not that he has failed to exercise reasonable skill and care in carrying out the work but that he has failed to supply what was contracted for."

Jackson et al (38) state that the particular obligations of a carpenter to his client are generally of a different nature to those owed by a professional man to his client.

The above does not state expressly that the contractor's obligations amount to a 'fitness for purpose' requirement. However, the statement "*..... my complaint against him is not that he has failed to exercise 'reasonable skill and care' in carrying out the work but that he has failed to supply what was contracted for*" may imply a 'fitness for purpose' requirement. Case law has sought to define the level of competence and the degree of skill and care required. However, the author has been unable to find a precise definition for the term 'fit for purpose'. Interview data (see interview 15, p.15/3) implies that the interpretation is highly dependant on the facts and circumstances of each particular case.

The above may present a problem for a contractor designer in design and build contracts, or if contractors who are undertaking a design and build contract decided to 'subcontract' their design to a professional designer. Cornes (40) states;

“ In the traditional method of contracting, where a designer is engaged by the employer to carry out the design and a contractor is engaged to carry out the construction of the work, there is a sharp distinction drawn between design on the one hand and workmanship and materials on the other hand. The design is firmly in the hands of the designer and the construction work firmly in the hands of the contractor. The JCT Standard Form of Building Contract in particular, and the ICE Contract, to a lesser extent, perpetuate this distinction. An employer faced with a defective building may have to bring claims against both the designer and the contractor because many defects fail to fall clearly into either the design or the workmanship category. In the design and build contract, or the package deal or turnkey project, the philosophy is different; the contractor not only takes on the job of constructing the works but also of designing them. This has the effect of fundamentally altering the contractor's obligations in respect of design.”

Even if the legal and contractual attempts to make the distinction are valid, they do not mesh well with the practical situation where even the traditional method of contracting often involve subcontracts where the subcontractor is required to provide some design.

Nevertheless, Cornes (40) also states that;

“ the implied warranty to carry out the work in a workmanlike manner will not readily be excluded. Likewise, the warranty to use materials of good quality will not be displaced, even in circumstances where the particular materials have been specified by the employer of the designer. However, the 'fitness for purpose' warranty is readily excluded in traditional building contracts where the employer does not rely on the skill and care of the contractor in selection of the materials. The position is, of course, different in design and build contracts, where, usually, the employer will be relying on the contractor in the selection of the materials. The warranty as to 'fitness for purpose' almost certainly extends to the design in design and build contracts. Although there is no direct authority on the point, there are many comments in judgements to demonstrate that a court would be highly likely to find that the warranty for 'fitness for purpose' extends to the design obligation.”

Cornes (40) suggests that the warranty for 'fitness for purpose' in the selection of materials may only subject the contractor to this level of liability in design and build contracts. Nevertheless, the author suggests that it can also exist in traditional method of contracting where the contractor may have a choice to make even when the designer has specified the materials.

3.3.4 CASES

3.3.4.1 INTRODUCTION

This section outlines cases where it has not been very clear what the liability level for professional designers under design and build contracts has been. It also outlines one case which shows the importance of adequacy of the knowledge of the designer about the intended use of the structure. Each case has its own particular circumstances but the judgements in them have been similar.

3.3.4.2 GREAVES (CONTRACTORS) LTD. v BAYNHAM MEIKLE AND PARTNERS (1975)

This case has been mentioned by at least three different authors, Stuart-Ranchev (33), Jones (41) and Jackson et al (38), as a classical case which illustrates the transfer of the 'fitness for purpose' liability from contractors to professional designers.

Greaves were building contractors who undertook to design and construct on a 'package deal' basis a new factory, warehouse and offices for Alexander Duckham Ltd. The warehouse was to be designed to be used for the storage of barrels of oil. Greaves engaged Baynham Meikle & Partners structural engineers to design the structure of the warehouse and told the engineers that the floors of the warehouse had to take the weight of fork lift trucks carrying barrels of oil. The warehouse was then built in accordance with the engineer's design. When the warehouse was brought into use the floors began to crack. The cracking was due to the vibration caused by the fork lift trucks and was not due to any shrinkage of concrete as contended by the structural engineers.

The judge held that the design of the floors was such that they did not have sufficient strength to withstand vibrations and he gave judgement in favour of Greaves. The Court of Appeal held that the parties common but unexpressed intention was that the engineers should design a warehouse which would be fit for its intended purpose for which it was required and that there was, therefore, an implied term in the contract with the engineers to that effect.

Jones (41) commented by stating that from this case, it can be shown that the Court of Appeal assumed that the 'fitness for purpose' liability has been transferred to the designers via the contractors. Even though, in tort and in contract, the designer's liability is to exercise 'reasonable, skill care and diligence' in performing their duties. He also stated that Kilner-Brown J., at first instance confronted with evidence indicating a divergence of view as to what a competent engineer would have done and a strong body of opinion that the defendant engineers had not failed, held that the engineers were not in breach of their duty to exercise reasonable care and skill. But on the facts he held that the engineers owed a higher duty and that they were in breach of that duty. The Court of Appeal, although upholding the judge's decision, reversed him on this point. It was held that there was no such higher duty on professional men and that what the judge meant was that in the circumstances of the case special steps were required to discharge the duty to exercise reasonable care and skill and that those steps had not been taken.

It was held in this case that the defendant engineers were in breach of an implied term in their contract with the contractors that their design would be reasonably fit for the purpose, namely for use of loaded fork lift trucks. The judges in the Court of Appeal were at pains to emphasise that the term was implied in the particular circumstances of the case and that they were not deciding whether an architect or an engineer employed to design a house or a bridge impliedly warranted that his design would be fit for the purpose. Lord Denning M.R. mooted that that question might have to be answered some day as a matter of law.

This case may also raise the question of how much information is needed from the client about the intended use of the structure. Does it become a wholly designer's responsibility to find out all the required information? It may be possible that if the designer did not establish all the facts about the intended use of the structure, then it may be held that he did not exercise 'reasonable skill and care', even if it was judged that there was not an implied term of 'fitness for purpose' liability.

3.3.4.3 I.B.A. v. E.M.I. and B.I.C.C.(1980)

This case has also been mentioned by several authors. Jackson et al (38) stated that in this case, the plaintiff employers (I.B.A.) engaged the first defendants (E.M.I.) as main contractors for the design, construction, and erection of a television mast and they in turn engaged the second defendants (B.I.C.C.) as subcontractors for design, construction and erection of the mast. There was no contract between I.B.A. and B.I.C.C. but it was conceded by the latter that they owed a duty of care to I.B.A., possibly because B.I.C.C. gave I.B.A. a direct assurance, in response to a specific request, that the mast would not oscillate dangerously. The assurance proved false and the mast collapsed. The House of Lords held that B.I.C.C. were negligent in the design of the mast and consequently in giving the assurance and were accordingly directly liable to I.B.A.

In this case, it was argued for the sub-contractors, B.I.C.C. who had designed the television mast, that since design was normally a function for a professional man they should be under no higher duty than that generally applicable to such a man namely a duty to exercise reasonable care and skill according to the accepted standards of his profession. The argument was rejected by the Court of Appeal on two grounds. First, the issue of the extent of the contractors' and subcontractors' obligations in relation to design had to be determined in the ultimate analysis by reference to the interpretation of the contract concerned. There was no good reason for not importing into the contract between I.B.A., the employer, and E.M.I., the main contractor, and between E.M.I. and B.I.C.C., an obligation as to reasonable fitness for the purpose or for importing a different obligation in relation to design from the obligation which plainly existed in

relation to materials. Second, there was a good commercial reason in favour of such an obligation. Contracts such as the one concerned should be interpreted so that ultimate liability, if something went wrong, should rest where it properly belonged. The Court of Appeal's decision on the point is the more striking in view of its decision that B.I.C.C. were not liable in negligence. On appeal the House of Lords held that B.I.C.C. were negligent and most of their Lordships, therefore, did not consider it necessary to decide the issue of the extent of the contractual obligation as to design. The issue was, however, considered *obiter*⁷ by Lord Scarman. He saw no reason why one who in the course of his business contracted to design, supply, and erect a television aerial mast was not under an obligation to ensure that it was reasonably fit for the purpose which he knew it was intended to be used. He did not accept that the design obligation of the supplier of an article was to be equated with the obligation of a professional man in the practice of his profession.

On the opinion of Lord Scarman, Jess (42) commented that,

“Being *obiter*, this opinion of Lord Scarman is only of persuasive force in the courts, and at this point in time it can only be said that it will require further cases to be taken before the courts for it to be seen whether English law is truly now viewing the building of structures and the like, in the same light as the sale of a pair of shoes or a coffee grinder, for instance.”

3.3.4.4 CONSULTANTS GROUP INTERNATIONAL v. JOHN WORMAN Ltd.(1987)

Jackson et al (38) also mentions this case. The plaintiffs (CGI) provided specialist architectural and consultancy services under an agreement with the defendant contractors (“the CGI agreement”) in connection with an abattoir by the defendant under a contract with the abattoir owner, Turner (“the Turner agreement”). Provided that the design and construction of the abattoir fulfilled certain criteria, Turner was entitled automatically to a domestic United Kingdom grant and was entitled to be considered for a further E.C. grant. When CGI sued the defendant for fees, the defendant counterclaimed for alleged

⁷ an observation by a judge on some point of law not directly in issue in the case before him and thus neither requiring his decision nor serving as a precedent, but nevertheless of persuasive authority.

breaches of the CGI agreement. Preliminary issues were ordered to decide *inter alia*⁸ whether:

- a. it was a term of the Turner agreement that the works and/or designs would be fit for their purpose;
- b. whether it was a term of the CGI agreement that CGI would carry out their works so that the completed project would be fit for its purpose; and
- c. whether CGI would be liable to the defendants if the designs and specifications of CGI were not such as to comply with the design requirements entitling Turner to be considered for an E.C. grant.

Judge Davies Q.C. held that, in the context of the case, 'fitness for purpose' really meant that works should be designed and executed to the standards demanded by United Kingdom and E.C. requirements for grant aid with the result that issues (b) and (c) fell to be considered together. He then held that on a true construction of the contract documents it was an express term of the Turner contract that the works should be fit for this purpose and further held that if he was wrong, such a term would have been implied. The judge found that the defendants had made it clear to CGI that they had no experience of abattoir work and would be dependant on CGI's experience and expertise and that CGI were the 'prime movers in the project from start to finish'. As a result he found that it was also an express, alternatively an implied, term of the CGI agreement that the works would be so designed by CGI that the completed project would be fit for its purpose.

It is submitted by the courts that the approach of Judge Davies Q.C. in Consultants Group International in undertaking an analysis of the relationship between the designer and his client is correct. It is also submitted that there will be no absolute answer as to whether one who designs but does not supply an article or build a structure is under a duty to ensure that it is reasonably fit for its intended purpose but such a duty will not be

⁸ among other things.

implied by law. It will therefore arise either on a true construction of the parties agreement or as an implication from the common intention of the parties.

3.4 LIABILITY LIMITATION IN PRACTICE

This Section includes research conducted by the author through interviews and surveys within the construction industry. Initial research established that the problem of design liability may be significant in its extent. The author, therefore, conducted his research to establish the validity and extent of this view. The interviews and surveys were also conducted to discover the specific nature of the problems encountered in practice and to elicit views on their solutions for any recommendation to be made on a solid basis.

Interview data and industry surveys conducted both reveal that for projects in the construction industry, both levels of liability are extensively prevalent (see Appendix B, Table 7). This is the case for both contractors and specialist subcontractors (undertaking specialist construction work) (see Appendix D, Table 10).

Interview data also reveals the wishes of clients and contractors and the way the issue is approached in practice. Several authors have also addressed the subject of design liability and the complications it presents in practice. It seems that there has been discrepancy between practice and existing standard Conditions of Contract (more details in Section 3.5). For example, Uff (43) stated,

“The contractor’s design responsibility subject has always had something of a Cinderella existence, its true potential and importance being concealed beneath a droll exterior. Thus, under the well-known JCT forms of contract, there was often a conflict between the Conditions of Contract and actual events, particularly where design work was undertaken by nominated subcontractors.”

On a different note, Goudsmit (44) questioned unlimited design liability of contractors undertaking design and build contracts. He stated;

“Why should a design and build contractor have a more extensive liability as to his design work than a professional designer? Why should the liabilities resulting from a design and build contract be greater than those accumulating under a traditional contract structure?”

In most cases, it may seem obvious that clients would want contractors to have a ‘fitness for purpose’ liability. However, research has revealed that this is not necessarily the case. Some clients would prefer to have a ‘fit for purpose’ liability imposed (see interview 6, p.6/9) but there are clients who may not necessarily have this preference (see interview 12, p.12/5). Some clients recognise the problems posed by the strict ‘fitness for purpose’ liability. One aspect is commercial where they realise that a contractor may not be able to obtain liability insurance for that level (more details in Chapter Four). The other aspect is legal where they realise that a contractor may not be able to pass down that liability to any designers who may be undertaking design work.

On the other hand, contractors, and understandably so, would always want their liability to be limited to ‘reasonable skill and care’ (see interview 8, p.8/6). There are several reasons for this. The main reason will be further discussed in Chapter Four, which is the availability of ‘fitness for purpose’ insurance. Also, within a climate where design and build contracts are on the increase, the other reason is the one outlined above where contractors may tend to ‘subcontract’ their design to a professional designer. Section 3.3.3 showed that the professional designer’s liability only amounts to ‘reasonable skill and care’ in contract and in tort. According to interview data (see interview 11, p.11/5), sometimes contractors employ designers without passing down the risk of ‘fitness for purpose’. They may have to do that because the architect or the engineer may not agree to that level of liability unless he has agreement from his Professional Indemnity insurers that they will provide the cover. Unfortunately, most of the time insurance of this level of liability is not offered by the insurance market (see interview 9, p.9/8) (more details in Chapter 4). Nevertheless, the author already mentioned in Section 3.3.3 that the problem of passing down the risk may not only exist for design and build contracts. Even the traditional methods of procurement may involve subcontracts where the subcontractor is required to provide an element of design.

3.5 LIABILITY LIMITATION CLAUSES WITHIN FORMS OF CONTRACT

It has been mentioned in Section 3.3.3 that the 'fitness for purpose' liability would be implied (by Statute) in contract for contractors design and workmanship. This would be the case unless it has been expressly limited within the contract to 'reasonable skill and care'. However, the author will show that liability limitation clauses within existing standard forms of contract may not necessarily serve their purpose as to limiting the liability of contractors to 'reasonable skill and care'. Some writers have commented about the legal interpretation of them. For example, starting with JCT81 (45), Stuart-Ranchev (33) shows that Clause 2.5.1 of JCT81 expressly provides that the contractor has the "like liability as would an architect, or as the case may be, other appropriate designer".

This may be limiting the contractor's design to 'reasonable skill and care' but this may not necessarily be the case for a specialist subcontractor supplying design because Stuart-Ranchev (33) comments that in relation to this Clause, the Architect's standard terms under the RIBA Standard Conditions of Appointment expressly exclude liability in relation to specialist subcontractors' design. If the Contractor's liability is expressed to be the "like liability as an architect would [have]", then what is the position in respect of specialist subcontractors?

Within the ICE Conditions of Contract 6th Edition (46), the liability is limited through Clause 8(2) which states,

"The Contractor shall exercise all reasonable skill care and diligence in designing any part of the Permanent Works for which he is responsible."

The ICE Design and Construct Conditions of Contract (47) also have a similar Clause incorporated. It states,

"In carrying out all his design obligations under the Contract - - - - - the Contractor shall exercise all reasonable skill care and diligence."

In relation to these Clauses, they state that the contractor is to exercise 'reasonable skill and care' but at the same time they do not specify that the end product does not necessarily be fit for its intended purpose. The interpretation of the clauses may be that the contractor has to exercise 'reasonable skill and care' and the structure may still need to be fit for its intended purpose. In other words, they do not really limit his liability. This has been ascertained by interview data (see interview 15, p.15/1). On the same note, Uff (43) commented that the intention appears to be to limit the contractor's design responsibility to one requiring proof of negligence. But, he also stated that the clauses are not expressed as a limitation of liability. There is apparently nothing to prevent it being "expressly provided in the contract" that the contractor shall design some element of the works to achieve a particular result.

The ICE Conditions of Contract 5th edition (48) do not have a clause limiting the contractor's liability. The reason might have been that the contractor was not expected to have any design duties. The GC/Works/1 (49) does not mention limitation of the level of design liability for contractors.

Model Form MF/1 (50) does not limit the contractor's liability in relation to the Works. On the contrary, Clause 36.9 states,

"The Contractor's liability under this Clause shall be in lieu of any condition or warranty implied by law as to the quality or fitness for any particular purpose....."

Bateman (51) stated that under a priced based process plant contract, the contractor can have either a strict 'fitness for purpose' liability or a liability of reasonable care and skill. He stated that IChemE Red Book (52) has the former: Clause 3.3 reads,

".....the Plant as completed by the Contractor shall be in every respect suitable for the purposes for which it is intended."

By assuming that the ICE Design and Construct limits the contractor's design to 'reasonable skill and care', he also stated that the background to the ICE Design and Construct (D & C) and the IChemE Red Book is rather different. The civils D & C contractor would probably employ a consulting engineer to do the design work. Such a consultant is unable to accept liability greater than that of 'reasonable care and skill'. The draughtsmen of the ICE D & C form recognised that and chose not to leave the contractor carrying a risk that he could not pass on and which he was ill-equipped to carry himself. In contrast, process contractors often develop processes in a research facility and therefore can test and refine the process before marketing it. Such processes are often the subject of patents etc. and details may be subject to restrictions (for commercial reasons). That, together with feed stocks often being of a consistent quality, leads to a strict 'fitness for purpose' liability being acceptable to the contractor as well as desirable to the purchaser.

Even though, Bateman (51) also stated that under a cost reimbursable process plant contract (53), the only level of liability that is possible is one of 'reasonable care and skill' and that this level of liability applies to all aspects of the work, there being no facility to price any greater risk, the author of this thesis has been unable to find any clause that limits the contractor's liability to that level.

When we approach the NEC (1), we find that its Clause 20 requires compliance of the contractor's design with the Works Information. The NEC has a level of liability limitation Clause through its Optional Clause M which states,

"The Contractor is not liable for Defects in the works due to his design so far as he proves that he used reasonable skill and care to ensure that it complied with the Works Information."

If the Optional Clause is not used, the author has been able to find that the contractor's liability may be interpreted either way. That is, it may or may not be interpreted as a strict 'fitness for purpose' liability. The obligation for 'fitness for purpose' may be overriding the obligation of compliance with the plans and specifications. Hudson (54) states,

“Where a contractor undertakes “to carry out work which will perform a certain duty or function, in conformity with plans and specifications, and it turns out that the works constructed in accordance with the plans and specifications will not perform that duty or function, it would appear that generally the express obligation to construct a work capable of carrying out the duty in question overrides the obligation to comply with plans and specifications, and the contractor will be liable for the failure of the work, notwithstanding that it is carried out in accordance with the plans and specifications...”

A case which illustrates this potential danger for contractors has been stated by Stuart-Ranchev (33). In *Brunswick Construction Ltd. v. Nowlan & Others* (1974), the contractor entered into a contract with the plaintiff to build a house in accordance with the drawings and specifications. These had been prepared by an architect employed by the plaintiff, but no architect or engineer was involved beyond the design stage. Due to a design defect, the completed house started to leak. The contractor was held liable to the plaintiff because a company of its experience should have detected that the design was defective; the house-owner not having an architect or engineer to supervise the works must have been taken to have relied entirely on the skill and attention of the contractor; and knowing of the reliance based upon him, the contractor was under a duty to warn; the contractor’s obligation was to carry out work which would perform the intended function and this overrode the obligation to comply with the plans and specifications.

She also comments that performance specifications are a potential source of design liability even in non-design building contracts. Contractors in a non-design contract, should consider the extent to which the specification is a performance specification, and make it very clear as part of their tender and in the contract documents that they are not undertaking to do anything other than build to a design to be fully furnished by the employer’s design team or by the design subcontractor.

3.6 LIABILITY SPECTRUM

The plans and specifications, therefore, may be producing a spectrum of liability which is dependant on the way they are drafted. See Figure 2 below;



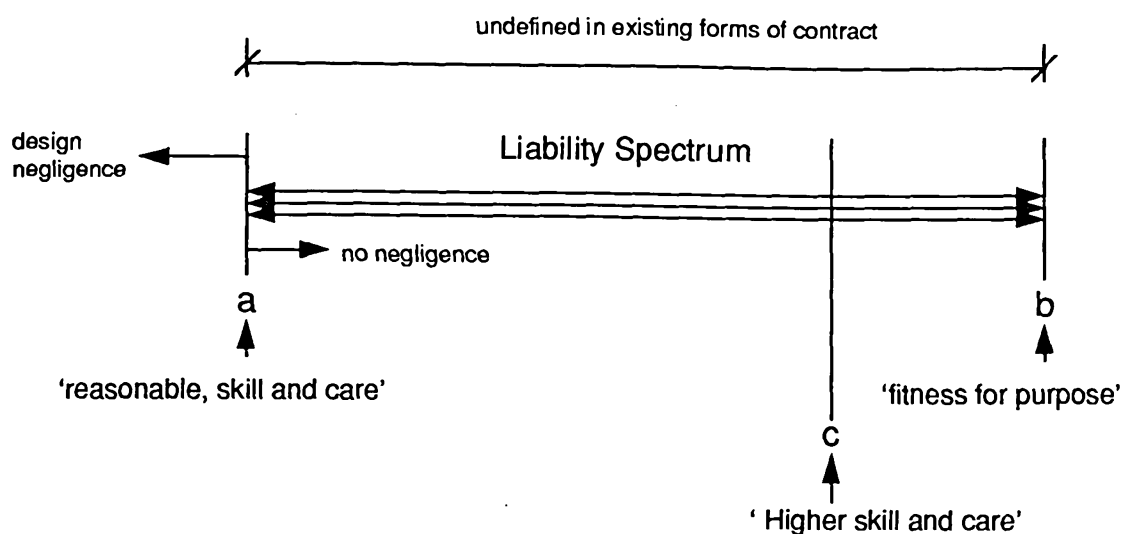


Figure 2: Liability Spectrum

In Figure 2, the spectrum may be totally dependent upon the plans and specifications, or in the case of NEC, the Works Information. At one end of the spectrum (boundary b), the contractor will be held liable if the works or part of the works are not fit for their intended purpose. That, however, will be based on the assumption that the client has very clearly communicated his requirements and defined his purposes. In this case, the liability may be due to design, defective workmanship or defective materials. At the other end of the spectrum (boundary a), the contractor will only be held liable if it was proved that he was negligent. Legally, these two boundaries may be perceived as easy to define. However, the spectrum in between may or may not be produced depending on the particulars of each case. For example,

a. there may be a case where it can be stated that if 'reasonable skill and case' was exercised, then the works would have been fit for their intended purpose, for example the case of *Greaves (Contractors) Ltd. v. Baynham Meikle and Partners (1975)*. In this case, boundary 'a' was superimposed on boundary 'b' thus cancelling the spectrum in between.

b. compliance with the plans and specifications may have ensured a 'fit for purpose' completed works but in actual fact inadequacy of information supplied by clients caused the problem, for example, the case of Stormont Main Working Men's Club & Institute Ltd. v. J.Roscoe Milne Partnership (1988) which has been mentioned by Stuart-ranchev (33) and signifies the importance of conveyance of information about the intended purpose to the designer. In this case, the architect, who was particularly experienced in designing working men's clubs (including snooker facilities), was sued by his client when it became apparent that there was insufficient space for competition play. The judge found that,

"the expectations of the client, so far as the architect can be expected to be aware of them, are relevant when considering the duty of the architect to seek clarification of his brief and also that the architect has a duty to exercise due care to ensure that the design should be reasonably effective to achieve the client's purpose, so that if the client has expressed his instructions in terms which leave the architect in doubt as to what the purpose is, the architect has a duty to ascertain what is the purpose he is instructed to achieve."

The judge however decided that this was not the case here and that it was reasonable for the architect to assume only recreational purposes were required. In this case, the spectrum was produced but the liability laid with the client. Boundary 'c' may have been achieved by the architect if adequate information was supplied in the specifications. Clients, therefore, still have a responsibility towards communication of the purpose and adequacy of the plans and specifications and it does remain of paramount importance.

c. the spectrum may also be invoked in boundary 'c' where higher skill and care may be interpreted by some practitioners as 'reasonable skill and care' for example the case of George Wimpey & Co Ltd. v. D.V. Poole and others (1984).

For existing forms of contract, no attempt is made to take into account and to recognise that this spectrum is in existence. We have seen that all of them attempt to limit the contractor's liability to either boundary 'a' or 'b'.

Due to the spectrum shown, it is very hard to define the meaning of the term 'fit for purpose'. Assuming that the NEC Secondary Option Clause M which limits the contractor's liability is not used, then the contractor may be subjected to a 'fitness for purpose' liability. However, the NEC does not mention it. As shown in Section 3.5, the requirement from the contractor is to prove that his design complies with the Works Information. In the opinion of the author, that takes into account the existence of the spectrum since it is dependent on the plans and specifications (the Works Information). The only danger for the contractor would be inadequacy of information supplied by clients. However, in this case, the liability would remain with the client unless the contractor, as a designer, did not exercise 'reasonable skill and care' in seeking adequacy of information.

The ECC (55) Secondary Option Clause M states;

“ The Contractor is not liable for Defects in the Works due to his design so far as he proves that he used reasonable skill and care to ensure that it complied with the Works Information.”

If the NEC (ECC) Optional Clause M is used, then the interpretation will probably be different from the the interpretation of other Clauses, for example the ICE Conditions of Contract, in two ways. The first is that unlike the ICE, this one does limit it to 'reasonable skill and care', by mentioning of the words “ *The Contractor is not liable*”. If it is not fit for its intended purpose and the contractor can demonstrate that he exercised 'reasonable skill and care' then he will not be liable (see interview 16, p.16/1). Second, it puts the responsibility for proof of negligence on the contractor (see interview 12, p.12/6). He is the party who has to prove that he exercised 'reasonable skill and care'. Before, the onus of proof of negligence was on the client to prove that the contractor did not exercise 'reasonable skill and care'.

Also, Clause M is a secondary optional one. This has the advantage of taking into account the differing needs of the industry. In Section 3.4, the author showed that not all

clients require a strict 'fit for purpose' liability from their contractors. The NEC takes into account this fact in leaving Clause M as secondary optional.

To date, the author has only found one author who totally opposes the way in which the NEC liability Clauses were drafted. Butcher (56) disagrees with the NEC Clause 21.1 of the First Edition (similar to Clause 20 of the Second Edition) by stating that;

“ the wording of clause 21.1 merely avoids difficult negotiations in the case of contracts which contain a fitness for purpose warranty, such as the BPF Form of Building Agreement, and also contracts such as JCT81, which exclude the statutory fitness for purpose warranty which would otherwise be implied. The question of defining the contractor's liability for his design is simply transferred from the core clauses to the Works Information. Even if the Works Information contains performance requirements, there will be absolute responsibility under the contract for failure to achieve those requirements. The NEC does not avoid the argument over design liability but simply transfers it. Within the NEC, no effort has been made to define the level of skill and care, and the Clause lacks the sophistication of the equivalent Clause in JCT81, which expressly states that the skill and care is that of a professional person responsible for producing an independent design to be constructed by a third party and that simply because the NEC does not contain legalistic terminology does not mean that lawyers will not rely on legalistic arguments where a design defect has arisen. Secondary Option M is an exclusion clause and that it will be construed *contra preferentum*⁹-in other words, against the interest of the contractor who is seeking to rely on it.”

The author, however, is unsure about the reasons why Butcher alleges that the clause will be construed against the interest of the contractor who is seeking to rely on it. The clause will have been chosen by the employer, so why should it be construed against the contractor? However, Butcher believes that there is a strong argument based on the lack of clarity in the drafting of this exclusion clause that it would not, under English law, operate to exclude the fitness for purpose and other warranties which would be implied by reason of the Supply of Goods and Services Act.

Against his comments, however, the author outlines some of the reasons NEC clauses are drafted in this manner:

⁹ opposing preference.

In drafting the clauses, the NEC database of comments (57) shows that the following has been assumed;

“that in the preparation of the design the contractor should be bound to do all that is necessary, and make any revisions required on behalf of the employer, to ensure that it is fully fit for its purpose, even in respect of unexpected problem coming to light after tender.”

NEC database of comments (58) also show that there are two difficulties for contractors. One is that the contractor may have to spend a lot of his own money to make good a guarantee that his design is suitable for its purpose, by the way he designs and builds the works in the first place. He usually does not spend money insuring that kind of risk, and it is largely uninsurable. The other difficulty is that an accident may occur causing damage to the works themselves or other property or personal injuries because a design failed in breach of guarantee, without any fault on the contractor’s part. It is difficult and expensive to insure against this liability.

3.7 OPTION MODELS

In this Section, the author summarises the Option Models that emerged from this research. The two most evident ones are;

- A. provide no express provision in the contract and therefore leave the contractor’s liability as provision of a ‘fit for purpose’ end product or,
- B. provide an express provision in the contract limiting the contractor’s liability to ‘reasonable skill and care’.

Although Model B seems simple, it may have some derivatives. These derivatives may tend to revert towards Model A (see Figure 3 shown below).

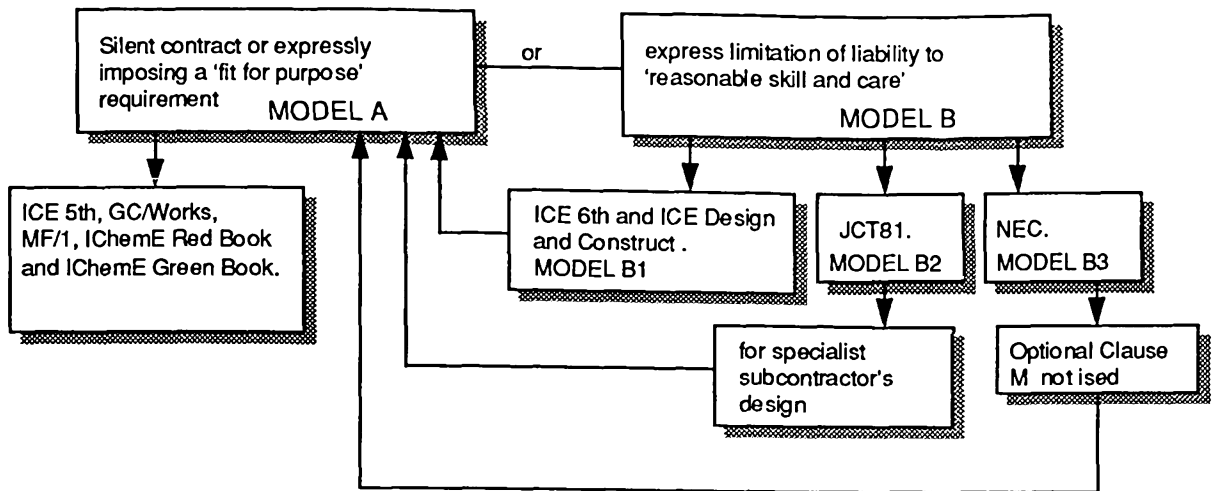


Figure 3: Limitation of Liability Flow Chart

It has been shown earlier that Model B1 may not necessarily be limiting the contractor's liability and thus it would be going backwards towards Model A. Model B2 has the potential problem for specialist's subcontractor's design rendering it Model A even if the main contractor has his liability a Model B. Model B3 may prove to be the best Model even though it has the potential danger of going backwards to Model A if the requirement for 'fitness for purpose' overrides the requirement of compliance with the Works Information. Also, due to the non-conformity of requirements in practice which has been outlined earlier in Section 3.4, for Model B3, it may prove a better option to retain Option M as an optional clause rather than having it as a core clause.

3.8 CONCLUSIONS

To summarise the findings of the research, they are as follows;

- Usage of strict level of liability 'fit for purpose' is still heavily prevalent in the construction industry in the UK but there is discrepancy between the requirements of clients for this level of liability.

- Specialist subcontractors, architects and professional designers can and may still have a strict 'fitness for purpose' liability imposed upon them.
- Design and build contracts are on the increase in the current construction climate and therefore limitation of liability is important due to the practical and commercial problem of insurance.
- There are not two distinct levels of liability but rather a spectrum which is dependent upon the Works Information and therefore clients also hold some responsibility.
- Many existing forms of contract do not have a limitation of liability clause incorporated within them.
- Some existing forms of contract have a limitation of liability clause that attempts to limit the liability but may not necessarily do so.
- Unlike other forms of contract where the liability limitation clause incorporated may not necessarily limit it, the NEC does limit the liability for contractors through its Optional Clause M.
- If Optional Clause M is not used, there may still exist an argument about whether Clause 20 of the NEC constitutes a strict 'fitness for purpose' liability.
- Legally, the requirement to comply with the plans and specifications may be overridden by the 'fitness for purpose' requirement.

Through his research, the author has also established that Case Law, for both contract and tort, does not provide a clear statement which defines the term 'fit for purpose'. He established that this is dependent on the particulars and circumstances of each case. The spectrum of liability shows that the distinction between the two levels of liability, 'fitness

for purpose' and 'reasonable skill and care' is not explicit. As shown earlier in Section 3.5, the law does not provide a robust distinction between the two levels of liabilities to the extent that one may be superimposed upon the other. Still, the author believes that if the liability is unlimited in all circumstances, it will create a potential problem for professional designers and architects who may have design subcontracted to them via a main contractor undertaking a design and build contract. The potential problem will manifest itself in terms of obtaining the adequate professional indemnity insurance (for more details see Chapter Four). As some cases showed, the extent of the design liability of a professional designer for his subcontracted design may not be 'reasonable skill and care' if the contractor's liability amounts to a strict 'fitness for purpose'.

The NEC has attempted to make the limitation of liability for design as optional. From the above research findings, the author concludes that a core clause limitation of liability may not be ideal due to the differing requirements of clients.

If the liability is not limited however, attention needs to be paid to the plans and specifications, or the Works Information in the case of the NEC and the way these are drafted as liability for 'fitness for purpose' may still exist overriding the compliance with the Works Information requirement.

Overall, in the light of other Models, Model B3 may be the most appropriate for the requirements of the construction industry in the UK.

CHAPTER FOUR: LIABILITY INSURANCE

4.1 INTRODUCTION

Within Chapter Three, the different levels of design liabilities were addressed. This Chapter is concerned with the insurance of those liabilities.

Comments received during the development of NEC and early feed back from its use indicated the need for research which, on a wider front, would be relevant to the increasing use of Design and Build contracts. Chapter Three showed that one main reason contractors require their liability to be limited to 'reasonable skill and care' is the unavailability of 'fitness for purpose' liability insurance in the UK construction insurance market. In this Chapter, the author investigates, on a broad level, the extent of the availability of insurance for 'fitness for purpose' liability as opposed to 'reasonable skill, care and diligence' liability and the conditions under which they may be offered. Also, in this Chapter, the author also investigates different means of self-insurance and proposes that they may be offered as an alternative to commercial insurance offered by the UK insurance market.

This Chapter also includes research on the different cycles of the insurance market in the UK and how it affects availability of construction risks insurances.

4.2 HYPOTHESES

The author initiated the research based on the first hypothesis given below. During the course of the research, the author was introduced to the notion of self-insurance. This, coupled with the unavailability of 'fitness for purpose' liability insurance, led the author to develop hypothesis (2) which was then tested through interviews. It can be interpreted that the first statement may have served as a *research statement* rather than a hypothesis while the second is seen by the author as the hypothesis of this area.

- 1) 'Fitness for purpose' liability insurance is unavailable from the insurance market for the contractor who is required to provide an end product which is fit for its intended purpose.
- 2) Self insurance may be adopted by contractors as a means of insuring the unavailable 'fitness for purpose' design liability in design and build contracts.

4.3 LITERATURE REVIEW

4.3.1 FITNESS FOR PURPOSE LIABILITY INSURANCE

Before approaching the detailed subject of 'fitness for purpose' liability insurance, it will be useful to first consider liability insurance in general. Several authors have provided some literature about liability insurance. The author outlines part of this literature here.

On a very broad level, Cannar (59) states that;

“insurers are concerned with two broad classes of cover. One relates to first party insurance, where the essential feature is that the policy pays for losses through specified perils irrespective of fault on the part of the holder, the only basic requirements being that of insurable interest and that the event producing the misfortune is fortuitous as far as he was concerned. Those requirements must be present also in the second category of third party insurance, but there it is the legal liability of the insured to someone not a party to the contract of insurance that determines whether he has to be indemnified within the terms of his policy by a payment being made to that third party.”

A breakdown of the legal liabilities that may be incurred and insured is provided by Cornes (40). He provides a general outline of the nature of liability insurance and what it is intended for by stating that,

“liability insurance is intended to provide protection to the insured party against specific legal liabilities to which he may become exposed as a result of activities culminating in bodily injury and/or property damage. The legal liabilities may be towards employees, in which case Employers' Liability Insurance would apply, or towards third parties who are not party to the insurance contract, in which case Public

Liability Insurance would apply. In the case of the design professional, legal liabilities incurred in the course of his professional work are covered under Professional Indemnity Insurance.”

In an atmosphere where design and build contracts are on the increase, contractors’ responsibility for design is also increasing. As such, they become subjected to the same legal liabilities as a professional designer. Within Chapter Three, the author has already discussed the different levels of liabilities that contractors may be subjected to regarding design in both contract and tort. The author has established that one level of legal liability that contractors might be exposed to, by the Supply of Goods and Services Act 1982, is ‘fitness for purpose’. The author has also demonstrated that there may be cases where professional designers might also be subjected to this level of liability. It is known that Public Liability Insurance and Professional Indemnity Insurance usually provide cover for a legal liability to the extent that a contractor or a professional designer has exercised ‘reasonable, skill, care and diligence’ in performing their duties.

However, like any other market, we find that the extent of insurances offered by the construction insurance market differ in their nature as to what is being offered and the quality of the commodity offered. As stated by Madge (60);

“The extent of insurance cover available differs enormously from one insurer to another. The insurance market is like any other market place-it has a wide variety of goods on offer-some are good, some are not good and some are mediocre. Likewise the degree of expertise of those insurers handling construction business and construction risks can be good, bad or indifferent. There are many insurers who understand deeply the ramifications of the construction industry; many underwriters who have spent a lifetime on it: but it is equally fair to say that there are many insurers and underwriters who do not. Some insurers are attracted by the investment income to be derived from the very high premiums involved. Get the premium in- the problems can be sorted out later on. Competition has always been a fierce element in the construction industry world.”

If we view the risk exposure for insurers providing Professional Indemnity covers, we find that for a while now, it has been noticed that claims against professionals has been on the increase. Batten et al 1967 (61) state,

“claims against professional men on grounds of professional negligence are on the increase and in some professions this is caused by the growing complications of present-day legislation. These developments cause some underwriters to have reluctance about participation in this class of business, particularly because the insured is indemnified not only in respect of his own acts of professional negligence but the acts of his staff. Also, while the insurers under competent advice may be satisfied that a particular claim against a professional man or his firm could not succeed in a court, the insured will rightly feel that the mere fact of an action having been commenced against him will prejudice him in the eyes of the public, even if he obtains a favourable judgement.”

The above quotation shows that, at least since 1967, there has been some reluctance by insurance underwriters to provide Professional Indemnity Insurance. This statement could be applicable for all the different levels of liabilities, whether it is ‘negligent act, error or omission’, or, ‘reasonable skill, care and diligence’ or the highest form of liability which is ‘fitness for purpose’. It is not surprising, therefore, that recent authors like Levine et al 1991 (62) state that;

“ the design and build contractor’s insurance market has taken the view that it is not the designer’s role in a design and build contract to provide a building which is ‘fit for the purposes intended’.”

Despite cases such as IBA v. EMI and BICC and Greaves (Contractors) Ltd. v. Baynham Meikle and Partners (see Section 3.3.4), which extend the duties and obligations implied under law of a design and build contractor’s obligations, the temptation under the JCT 1981 language is to reduce the design and build contractor’s obligation to a normal contractor’s obligation, and bolt on a designer’s obligation, similar to that of an architect (see Section 3.5).

Levine et al (62) also stated that;

“ the insurance market has backed up the temptation to limit contractor’s liability with Professional Indemnity Insurance, based on the normal principles of PII cover. However, the insurance market has not yet wanted to extend that insurance beyond that of a designer to a ‘fit for the purposes’ cover, on the basis that it does not believe that design and build will develop in that way. Hence, though there is

tremendous resistance from the underwriting market to that sort of extended cover, this is not to say that it cannot be procured in exceptional circumstances and on one-off projects.”

The literature, therefore, shows that cover for the more onerous liability of ‘fit for its intended purpose’ seems to be questionable. The author, therefore, has sought to research the extent of it and the implications of this on the industry through interviews and industry surveys. The findings are presented in the following Section 4.4.

4.4 ‘FITNESS FOR PURPOSE’ LIABILITY INSURANCE IN PRACTICE

The research has revealed that, in general, the insurance market is not static in its provisions due to many reasons. First, there are differences within the market itself as to what they would insure and what they would not. Also, the period during which insurance can be obtained also plays an important factor as sometimes the market can be at a ‘soft’ phase and sometimes it can be at a ‘hard’ one (more details and evidence are outlined in Section 4.5).

There are certain construction risks that are considered by the insurance market as ‘trade’ risks (see interview 11, p.11/3). These are risks which the market has decided that they are not insurable. From the insurers’ point of view, ‘trade’ risks are not insurable because ‘they are not supposed to be insured’ (see interview 11, p.11/5). Stated in this way it appears that this is a matter of principle. However, it also seems that this ‘principle’ can change as the market is not static in what it offers and what is considered as ‘trade’ risk today may not be so tomorrow (see interview 9, p.9/6, interview 11, p.11/5). Furthermore, contractors seem to take a different point of view and consider ‘trade’ risks are not insurable because they constitute a high risk to the insurers and insurers are becoming risk averse in the current climate (see interview 9, p.9/3) but this argument is countered by the market in that higher (impact and likelihood) risks are sometimes more attractive to insurers because higher premiums can be charged for them. Nevertheless, the exposure against the income has to be balanced.

Interview data (see interview 1, p.1/4, interview 2, p.2/1) shows that 'fitness for purpose' liability insurance is considered a 'trade' risk by the insurance market. In a normal professional indemnity contract, the 'fitness for purpose' liability insurance would be an exclusion but the contract between the insurer and the insured would not prevent negotiating that exclusion out in individual circumstances. The offer for the 'fitness for purpose' insurance would depend on several criteria, namely,

- a) the nature of the purpose.
- b) the likelihood of the claim in the event of the project not complying with the 'fitness for purpose'.
- c) the amount of the claim and the limit of indemnity.
- d) the amount of deductible or excess.

If it is to be included, then discussion with the insurer(s) would be about the extent of cover and the limits of indemnity which would be required and whether the insurer(s) are prepared to provide some or all of the cover that is required. In general circumstances, if 'fitness for purpose' insurance is considered, then it would be with a relatively small limit of indemnity and probably with a large excess or deductible.

Interview data (see interview 9, p.9/8) also reveals that generally most PI policies for major contractors have excesses varying from £1m. upwards for each occurrence. Large firms of architects and professional engineers also have excesses up to £1m. Smaller architects and professional engineers will have excesses of around £25,000 - £60,000 and smaller contractors will have their excesses around the same range. If 'fitness for purpose' is to be offered, then the excess for it will be higher than the respective normal excesses quoted above.

Earlier, the author showed that the insurance market does not insure certain risks as a matter of 'principle' only and at the same time, they can be insuring high impact and likelihood risks since they can claim high premiums for them. Whereas, contractors take the view that some risks are not insured because they constitute a high risk to the insurer.

The above shows that 'fitness for purpose' is considered by the insurance market as high risk since the criteria investigated is the nature of the purpose, the likelihood of the claim, the amount of the claim and the limit of indemnity and, the amount of deductible. It, therefore, suggests that contractors may be having a more accurate perception about the reasons for insurability of risks. In broad terms, the above outlines the nature of the risk involved and the underwriter's perception of it. The greater the chance of a risk occurring, the more likely the underwriter will resist taking the insurance.

However, further interview data (see interview 9, p.9/8) shows that the criteria outlined above is not the only criteria for offering 'fitness for purpose' insurance. It shows that one main criteria is the relationship between the underwriter and the contractor and his claims history. The insurance market offers 'fitness for purpose' insurance for the contractor whom they 'know and understand'. Interview data shows that the reason for this policy is that there are some contractors who may be willing to win contracts by offering clients 'fitness for purpose' liability on the basis that they have a cover for it. With this type of scenario, claims from these contractors on this level of liability increase. Therefore, insurers tend to offer the cover for the contractor who attempts to negotiate his liability to 'reasonable skill and care'. It, therefore, becomes a matter of 'trust and experience' of dealing with a particular contractor for a number of years.

Interview data (see interview 9, p.9/8) also shows that for architects, professional engineers and smaller contractors, they would have to approach insurers every time they are required to provide a 'fit for purpose' liability cover. Depending on the circumstances and the contract details, they may or may not obtain the required cover. However, experience shows that it is virtually impossible for architects and professional designers to obtain it. If they are in a situation where they have design 'subcontracted' to them by a design and build contractor who has a 'fitness for purpose' requirement, then they tend to disagree to that level of liability being passed to them unless they can insure it. The contractor then makes a commercial decision whether they would carry the risk or not.

Interview data (see interview 11, p.11/5) also shows that there are some insurers who challenge the view that 'fitness for purpose' liability insurance should be unavailable at large. The insurer stated;

“ I often said to the market, 'why is it that you insure a professional liability at least to the extent of 'neglect, error or omission' but you will not insure liability for defective workmanship or material in the same terms?' It is the same result. If the design is faulty and the building falls down or if it is defective workmanship and the building falls down, effectively it is the same exposure. The underwriter has a fine line between a professional and an ordinary carrying out ordinary work. They do not believe that they should be insuring someone who is performing ordinary work. They think that it is a 'trade' risk. The fact that the liability to select the right material or put one deck on another is a 'trade' risk. If contractors say that they are builders, then they should be able to do that. However, for some reason, they are happy to say that a professional man giving professional services such as a doctor, accountant, or an architect has his professional liability considered as insurable. I do not think there is very much difference but this is the market's viewpoint.”

Even though the author has established in Chapter Three that 'fitness for purpose' is still prevalent in construction (see Appendix C, Table 7, Appendix D, Table 10), this data suggests that the contractor will be undertaking the job (which could either be construction only or construction and design) without being insured for the liability of 'fitness for purpose'. It also suggests that a contractor undertaking construction work only will not be insured even to the level of exercising 'reasonable skill and care'¹⁰ in selecting his materials and provision of adequate workmanship. Nevertheless, it should be noted that the interviewee (see interview 11, p.11/5) has been responding to the specific issue of 'fitness for purpose' rather than 'reasonable skill and care', which suggests that his argument may have been for 'fitness for purpose' rather than 'reasonable skill and care'.

It may, therefore, prove wiser to insure the property or works (which is normally done under a normal C.A.R. policy) themselves rather than liability. Insurance of liability generally rather than property can have certain implications for the design and build

¹⁰ The author is assuming that the level of 'negligent act, error or omission' liability is the same as 'reasonable skill and care'.

contractor. For example, Uff (22) showed the effect of 'liability' insurance by illustrating the case of Wimpey v. Poole (1984), where the contractor undertook a design and construct contract for a new anchored quay wall. The wall suffered partial failure which was found to be due to softening of the clay at the toe. The contractor had a PI policy which covered claims arising from "any omission error or negligent act in respect of design or specification of work". The contractor carried out remedial work at his own expense and sought to recover the cost from the insurer, contending that it had carried out the design negligently. The commercial court held that the plaintiff had failed to establish his own negligence, but nevertheless, the failure of the design to make sufficient provision for softening of the clay amounted to an omission or error in respect of that design, and was therefore *prima facie* covered by the policy. For other reasons, the plaintiff failed to recover the bulk of its loss. The case illustrates the legal contortions that may arise from insurance of liability rather than property.

Within Chapter Three, the author has showed that the contractors and subcontractors are still exposed to 'fitness for purpose' liability. Interview data (see interview 9, p.9/1) shows that contractors will still price any risk that they cannot insure in which case, obviously, the industry needs to be aware of the extra costs incurred by clients for any contract, whether it is design and build or construction only, when 'fitness for purpose' insurance is not provided.

'Fitness for purpose' is still prevalent in the construction industry for both contractors and subcontractors. However, interview data shows that not all subcontractors are subjected to it. For example, one subcontractor (see interview 10, p.10/7) stated,

" We worry about it. We are aware of the distinction and even though our works are temporary works, they are still to a significance that in fact we are very wary about taking on a 'fit for purpose' risk."

Presumably, these subcontractors take design responsibility for their temporary works so their design would have to be 'fit for its intended purpose'.

Interview data (see interview 7, p.7/5, interview 8, p.8/8) also shows that there are some contractors who would not accept 'fitness for purpose' liability for either construction only or design and construct contracts if it is imposed upon them even in the current construction climate. It showed that even though they have been confronted by 'fit for purpose' liability, but generally, they have been able to avoid it as it is considered as a 'broad' risk to take.

On the other hand, interview data (see interview 6, p.6/12) shows that there are some clients who would not accept a lower level of liability than 'fitness for purpose' on the premise that if a contractor accepted to build something 'properly', then they should be able to do so. They also agree with the fact that the insurance market should treat 'fitness for purpose' as a 'trade' risk. The interviewee stated,

“ From my point of view as a client, I would say they would go about it by building what they say they would build properly. Why should an insurance company insure them in a situation where what in effect they are saying, 'I want insurance in case I cannot build what I said that I will build'. It seems to me that there is a risk that they cannot do what they say they can do. That is why they cannot get it. Therefore, why should we take a different attitude? If a company comes along and says, 'I am supplying you with a gas turbine that will be 65% efficient', then we will take it as said because that is what he said he can do. We will not be interested in 64.9%. However, we might consider accepting the 64.9% for some other considerations but for the price we are prepared to pay, we want 65%. Anything less than that has less value to it. If he says that he can do it, why should he be protected either by us or by an insurance company or by anyone else from the consequences of saying, 'I can make something which is fit for purpose'? Nobody has forced him to say that.”

However, interview data (see interview 12, p.12/9) also reveals that not all clients have the above mentioned attitude. For example, another client recognizes 'fitness for purpose' as a potential problem under any contract for contractors when insuring it and therefore, he would not ask contractors for that level of liability.

4.5 INSURANCE MARKET CYCLE AND ITS CURRENT STATE

Interviews revealed another factor that may be contributing to the unavailability of 'fitness for purpose' liability insurance. At the beginning of the previous Section, the author stated that the period during which insurance can be obtained also plays an important factor. Interview data (see interview 2, p.2/2, interview 11, p.11/6) shows that the insurance market in the UK is cyclical in nature. It is characterised by two phases, a 'soft' phase and a 'hard' phase.

The 'soft' phase is when the insurance market is willing to provide covers at low premiums. The cycle is largely cost driven as opposed to coverage driven even though, to some extent, one drives the other. The governing factor in the cycle is interest rates. The start of the 'soft' phase is when interest rates are high. The insurance companies would then try to obtain extra premiums on which they earn the loss of investment income. Popplewell (63) shows that insurance companies rarely make underwriting profits, i.e. earn more premium than they pay claims, so investing premium before they pay claims is essentially how they earn profit. Interview data (see interview 9, p.9/3) shows that the market as a whole, on construction, has an annual premium income of about £120m-£130m. The actual time between the date of the claim and its payment is usually considerable (about five years for a PI claim). When the interest rates are high, insurers can earn an extensive investment income on their premiums. In this climate, wide coverage is provided and there is a greater likelihood that insurers will accept risks of high impact and probability. During this period competition increases, tending to drive premiums down and the market capacity increases with resultant concerns about over exposure. If claims materialise from high value risks, concerns about over exposure will increase. Thus, the 'soft' phase becomes fragile and highly susceptible to any decrease in interest rates. This leads to the start of the 'hard' phase of the market. The weaker insurers are then forced out of the market and the market starts decreasing in capacity. Without competition, premiums increase and coverage narrows where only risks of low impact and frequency are covered. The cycle is repeated when interest rates start increasing again. The cycle is shown in Figure 4 below;

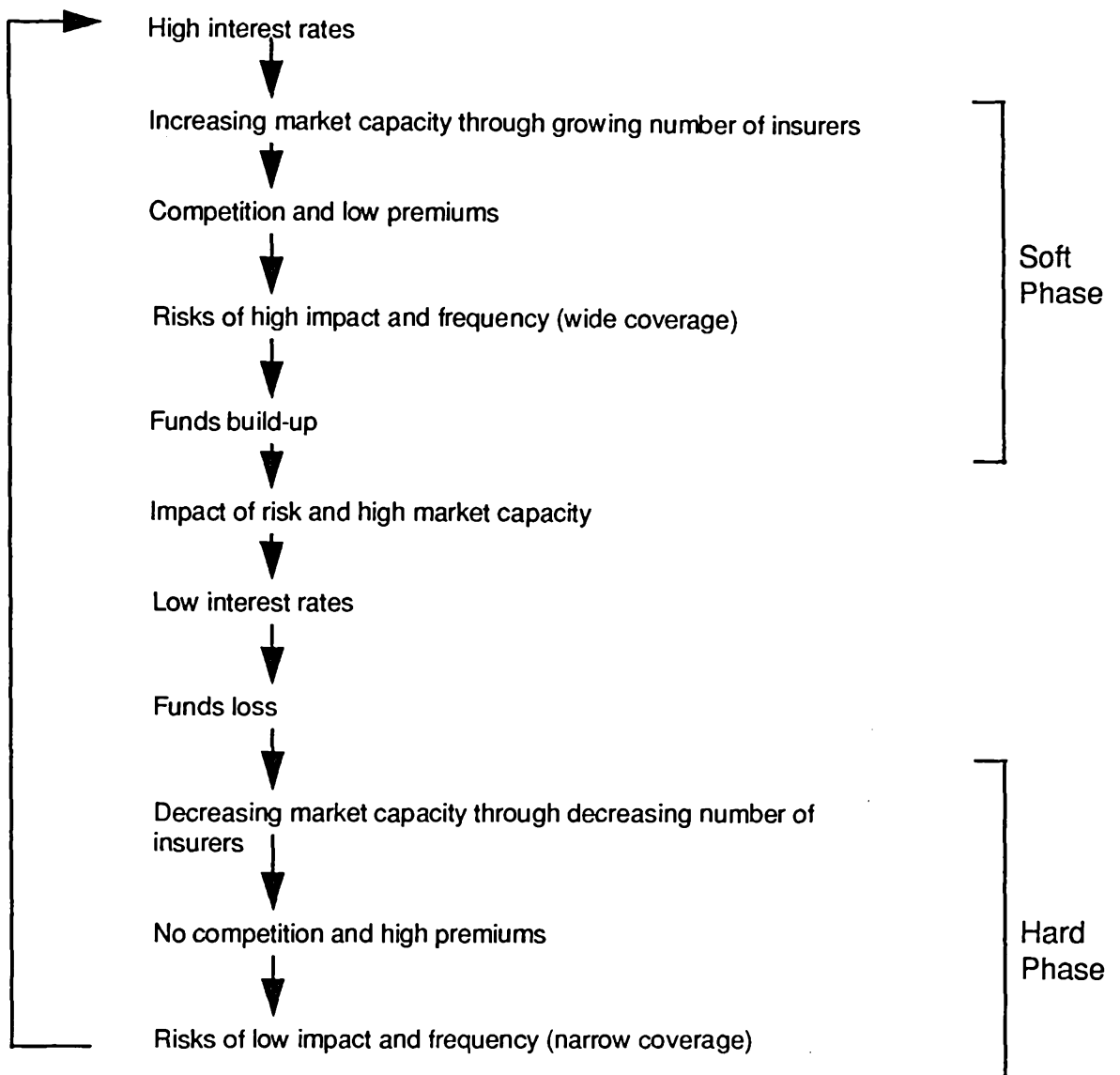


Figure 4 : Insurance Market Cycle

The period of each phase is variable but it can be at least about three to four years or even more (see interview 2, p.2/2). Also, it is usual for different categories of business to be in different 'cycles' (see interview 11, p.11/6). For example, it may be a 'soft' phase for fire risks or completed buildings insurance but it may be a 'hard' phase for other construction risks. The author is assuming that the reasons for this are that commercial judgement is needed to judge when to move from one phase to the other and insurers will

differ in their judgements. Low and high are subjective terms and the change point will be influenced by the precise returns on investment available to each firm and the individual judgement of what is an acceptable return. Aviation insurances went through a massively 'soft' period when there were many new aircraft being bought by airlines.

Interview data (see interview 11, p.11/6) shows that the current state of the construction insurance market is relatively 'hard'. The desire to take risks is reduced. Also, there is not very much interest in the new method of procurement PFI initiatives as it is not known whether that means more exposure or less. Therefore, there is extensive debate and suspicion about the risks involved. And also, many insurers have lost huge funds on construction risks, for example, London Underwriting Centre, Broadgate Fire and Heathrow Express. Interview data (see interview 9, p.9/3) shows that these two fires' claims were exceeding the premiums and investment income generated in previous years. The market capacity is reducing and it is very difficult to get wider coverage. Previously, the extent of coverage has been extensively widened. The original intentions behind certain wordings in policies have been expanded by pressure from buyers and brokers to provide more and wider coverage. At the moment, the reverse is happening where the market is trying to reduce coverage and it is trying to make the wordings narrower. However, there is always a constant dynamic in that. The policy of reducing coverage may change at any point in the future.

4.6 SELF INSURANCE

In addition to obtaining insurance from the commercial insurance market, Levine et al 1991 (62) state several other different types of insurance under the heading of self-insurance. They state that;

“ an alternative to traditional insurance is available to those involved in the construction industry by captive insurance company arrangements. A captive is an offshore based company set up for insurance purposes. It is always set up offshore and that is done for tax relief purposes.

There are two categories of captive. Firstly, the wholly owned subsidiary which only insures and manages all or part of the risks of its parent, known as a 'pure' or 'classical' captive (see Figure 5 below).

Secondly, the captive which is owned by several unrelated shareholders, for example, a sponsoring organisation, group or association, primarily for the benefit of its parent or sponsor (partial sponsor) (see Figure 6 below). It is known as a captive because it is not free to transact business independently. Examples of partial captives include group owned mutuals and pools. An example of a mutual captive in the construction context is the Wrens for major UK design firms.”

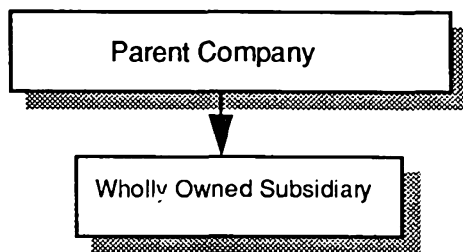


Figure 5 : Pure or Classical Captive¹¹

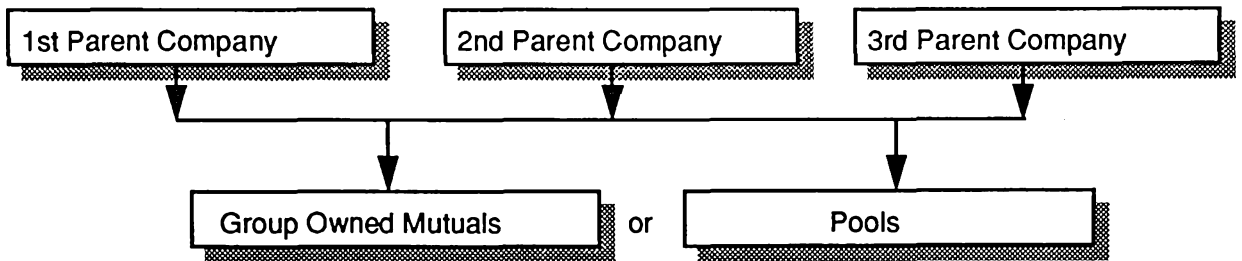


Figure 6 : Partial Sponsors¹²

Interview data (see interview 11, p.11/7) shows that some insurance companies that became commercial insurance companies started by being a group owned mutual captive. It also shows that a captive may be rented because the captive has the ability to rent its

¹¹ Figure drawn by the author.

¹² Figure drawn by the author.

capacity. It is termed 'rent a captive' and it is similar to a mutual but the partial sponsor is not part of the original consortium or parent company forming the captive. It is different from obtaining commercial insurance because there is no premium paid. Also, if the captive is profitable, an organisation may decide to write up risks for another organisation through its rented or owned captive.

Levine et al also state that;

“ other alternatives of self-insurance include operating a budget, funding mutual captives and participative insurance. Within an operating budget, losses will only be paid for as they are incurred, as no premium is available. Although this method does not require capital injection, nor is it regulated, it is only really practical when risks are of low value and high frequency. Any other type of risk is likely to affect performance of the company. Losses can be paid for out of operating budgets. This has a number of advantages. The first is the psychological impact of losses appearing in the budget. This can result in a significant attempt to improve the company's loss control. There is also a financial benefit as losses are paid for as they arise rather than in advance. Profit performance can also be improved as losses which do not occur are not paid for. This can have the added benefit of improving cashflow. If the loss level is satisfactorily low, then losses will remain deductible. Problems with this system arise when the losses are of an infrequent and sizeable nature. If the loss is such that it would seriously harm the overall or local management profit performance in that year, it could well act negatively in all aspects.

Another alternative is self-insurance and funding which involves setting up a separate fund in the company with the objective of earning sufficient investment return to fund losses. The disadvantage is that capital will be tied up and withdrawn from use on other ventures, and in addition, the tax benefits of most offshore captives will not be available. If losses are larger than those tenable above then a similar system can develop funds to pay for losses that would occur beyond a financial year. The same benefits would accrue but without the disadvantages. The disadvantage is that in most countries it is not possible to develop funds in such a beneficial way because the funds would be reduced at the end of each year by corporation tax payments. Where it is possible to fund without this tax disadvantage, as in the Netherlands, it is a very viable alternative, otherwise the captive solution is preferable.”

Interview data (see interview 11, p.11/7) shows that the fund for self-insurance can be organised in two ways; there can be just a different account which is internally managed

and there would not be a high administrative charge or, it can be account which is externally managed with the funds invested.

By drawing on Levine et al, the author has identified five main methods of self-insurance;

- a) Captive insurance company arrangements.
 - i) The wholly owned subsidiary 'pure or classical captive'.
 - ii) Partial Sponsor
 - 1) Group Owned Mutuals.
 - 2) Pools
- b) Operating a budget.
- c) Funding mutual captives.
- d) Participative insurance.
- e) Self insurance and funding.

In diagrammatic form, it looks as shown in Figure 7 below,

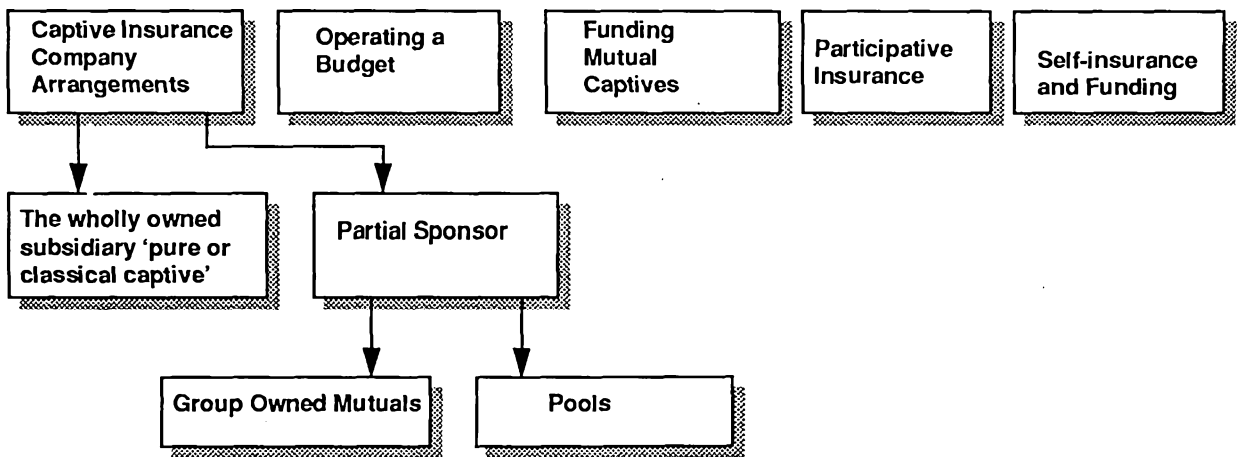


Figure 7 : Types of Self-Insurance

However, Levine et al do not explain funding mutual captives and participative insurance. It may be that the funding mutual captives option is part of the captive insurance

company arrangements. Through interviews, the author has sought further data on these means of self-insurance.

Interview data (see interview 9, p.9/9, interview 11, p.11/7) shows that if an organisation or a group has a captive or funding a mutual captive, then the parent may be capable of paying up to, for example, £1m per occurrence and £5m aggregate per annum (maximum paid on claims for risks per year) through their captive. Any amount beyond these aggregates, the commercial insurer (from the insurance market) would deal with all the claims and re-insure the captive above the retentions of £1m per occurrence and £5m aggregate per annum. For example, if the premium on a 100% basis for all of the insurances is X, then the commercial insurer will provide (X-2/3X) for taking the expenses of handling the claims and for taking the high level risk exposure. 2/3X will go into the captive to pay for the risks up to £5m aggregate per annum.

A risk may be of a high probability low impact with a relatively small claim or it may be of a low probability high impact with a high claim. Also, one occurrence may exceed the limits of the captive (e.g. £5m aggregate per annum). Therefore, the way risks are handled, whether it is one occurrence with a very high impact or different occurrences where only some may be falling within the boundaries and limits of the captives, is shown below in Figure 8;

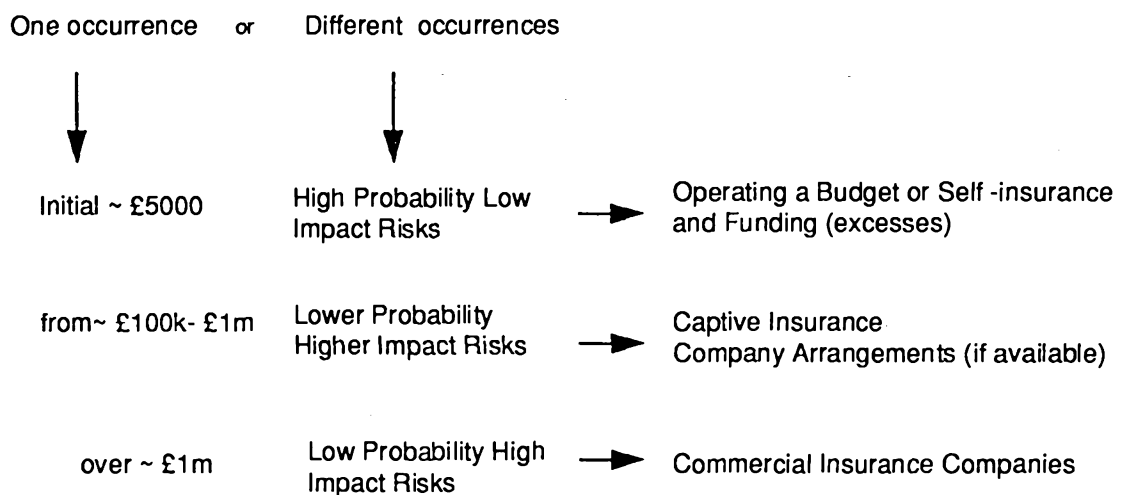


Figure 8: Captive Limitations

Greene et al (13) also provide conditions under which self-insurance is advisable. Although he does not state it explicitly, it is clear that the means of self-insurance he refers to are Operating a Budget and Self-insurance and Funding. The author is assuming that the working capital is the same fund for operating a budget and a loss reserve fund is the same fund for self-insurance and funding. He states that;

“ Self-insurance will not usually be attempted unless the loss, should it occur, is severe enough to cause financial embarrassment to the insured. The following conditions are suggestive of the types of situations where self-insurance is possible and feasible:

1. The firm has a sufficient number of objects so situated that they are not subject to simultaneous destruction. The objects are also reasonably homogeneous in nature and value so that calculations as to probable losses will be accurate within a narrow range. If these conditions are present, the firm will be able to predict accurately the size of future losses.
2. Management is willing and able to meet large and unusual losses either from working capital or from a loss reserve fund.
3. The firm must have accurate records or have access to satisfactory statistics to enable it to make good estimates of the expected loss. To increase the accuracy of the calculations, it is wise to use data over as long a period as possible, not merely the last five or ten years. If outside data are used, it is necessary to exercise extreme caution to see that the data employed are applicable to the firm's own experience.
4. The general financial condition of the firm should be satisfactory. There is a tendency for business persons who are in financial difficulties to believe that loss retention is a good way to save on insurance. While it is often true that the firm can save money by self-insuring, this is only possible when all of the preceding conditions are met. If the firm cannot afford insurance premiums, it is likely that the firm cannot afford the loss, should it occur.
5. Loss retention requires careful administration and planning. Someone has to be in charge of managing a self-insurance fund, paying claims, inspecting exposures, preventing losses, keeping necessary records, and performing the many other duties connected with any insurance program. If the necessary specialized executive talent is not available, and if the business cannot appreciate the necessity of paying continuing attention to all the details of carry-through, self-insurance will not be a satisfactory solution.”

4.7 LIABILITY INSURANCE OPTION MODELS

Based on the findings of the research, several option models were developed for this area. If we start with the question that has been addressed in Chapter Three, is design liability for contractors to be limited in design and build contracts? we will find that, as shown in both Chapters Three and Four, the question cannot be answered by a definite yes or no due to the differing needs of the construction industry. But in both cases, however, we can see that there are certain implications that lead to the option models shown in Figure 9 below;

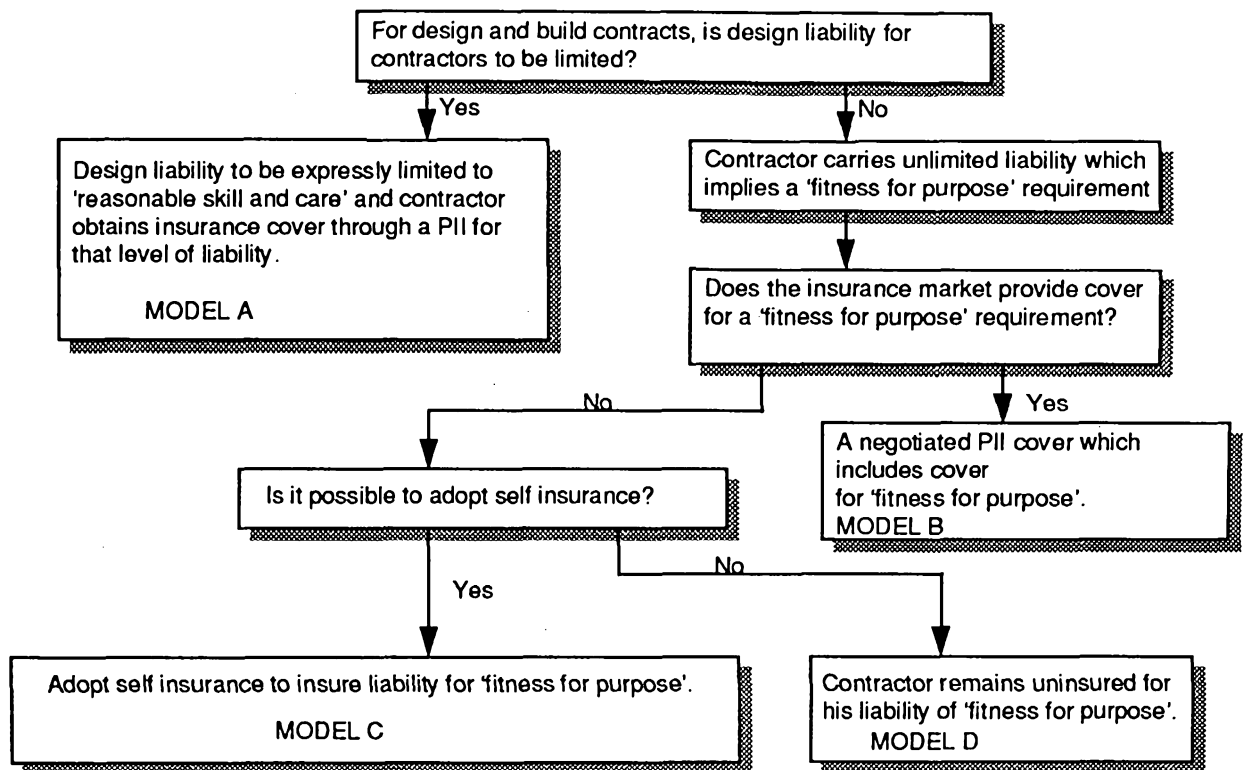


Figure 9 : Liability Insurance Flowchart

As shown, three models can be derived. If the contractor's liability is expressly limited to 'reasonable skill and care', then this leads to Model A where the contractor insures his liability up to that level. The contractor obtains a normal Professional Indemnity Insurance cover similar to that of a professional designer. However, if the contractor is

carrying a strict 'fit for purpose' liability, then he can try obtaining a 'fitness for purpose' cover, which constitutes Model B. If he cannot obtain a 'fitness for purpose' liability cover, then the research has revealed that Model C could be adopted. A contractor can insure the difference between a 'reasonable skill and care' cover and a 'fitness for purpose' cover (see interview 9, p.9/10) by adopting one of the means of self insurance.

4.8 SUMMARY AND CONCLUSIONS

4.8.1 SUMMARY

The research findings may be summarised as follows;

- The UK insurance market regards 'fitness for purpose' liability as a 'trade' risk and therefore, as a matter of principle, insurance is generally not available for all contracts.
- In some circumstances, insurance for 'fitness for purpose' liability may be offered by the market.
- The insurance market has different cycles where sometimes it is at a 'hard' phase and sometimes it is at a 'soft' one.
- Currently, and for an unknown period of time, the insurance market is at a 'hard' phase.
- The insurance market may offer insurance for 'fitness for purpose' on a broader scale if it is at a 'soft' phase.
- Most contractors would try to avoid signing a 'fit for purpose' liability but they may not be able to succeed in doing so on all their contracts.

- Some clients would require a 'fit for purpose' requirement in their contracts despite the knowledge that insuring it will be a problem for their contractors and some clients recognise the difficulties and therefore, they do not require it from their contractors.
- For architects and professional designers, it is virtually impossible to insure a 'fit for purpose' liability.
- Subcontractors may also face a 'fit for purpose' requirement and they may also not be able to insure it.
- There is no reason Model C may not be adopted for insuring a 'fit for purpose' liability whether it is for a contractor or for a professional designer who needs it.

4.8.2 CONCLUSIONS

From the above mentioned findings, several conclusions can be made. Contractors should attempt to adopt Model A even though they may not always be able to do so. 'Fitness for purpose' liability can also have the same implications for subcontractors, architects and professional designers employed for main contractors undertaking a typical design and build contract. However, if they are unable to exclude 'fitness for purpose' from their contracts, Model C may provide a possible solution. If needed, Model C may also be adopted by subcontractors, architects and professional designers. The author has demonstrated the general feasibility of the Model, however, it may not be feasible for very small contractors. Due to the reluctance of the commercial insurance market to insure 'fitness for purpose', it may be that Model A is the only option model which is feasible for small contractors. The author has already demonstrated that Model B, even though it is in existence, it is not extensively used.

4.8.3 RECOMMENDATIONS FOR FUTURE WORK

The research in this area has concentrated on the extent of the problem of insuring 'fitness for purpose' liability for contractors for all contracts. However, further work can try to establish the extent of the problem for subcontractors, professional designers and architects. The author has demonstrated that the problem exists for them as well as for contractors.

Further work can also try to establish the extent of the feasibility of Model C for small contractors, subcontractors, architects and professional designers if they needed to insure a 'trade' risk.

Also, another area which has not been covered by the author is the limits of indemnity that insurers are prepared to specify in the exceptional circumstances when they do insure 'fitness for purpose' liability.

CHAPTER FIVE:

LIMITATION OF LIABILITY AND FORCE MAJEURE

5.1 INTRODUCTION

Research conducted by the author into some of the NEC Panel¹³ papers (64), which were supplied by his supervisor Prof. John Perry (co-author of NEC and Panel member), showed that there were several risk allocation issues that needed to be addressed for the NEC 2nd Edition¹⁴(ECC). In particular, it revealed that use of the NEC 1st Edition in the power sector, particularly in South Africa, showed that large international contractors such as GEC (General Electric Company), ABB (Asea Brown Broveri) and Siemens were not willing to tender for projects under the NEC without changes to the form of contract which would accommodate limitation of the contractor's liability for certain risk exposures. In particular, the panel papers showed that those of the contractors' concerns which are relevant to limitation of liability and force majeure were;

- Unlimited exposure to correction of latent Defects if Clause 21.5 shows unlimited in Contract Data.
- The silence on consequential damages, which by implication renders the Contractor liable.
- The silence on events totally outside the control of the Parties (force majeure).
- The potential for a combination of unrealistic retention, delay damages and performance damages coupled with an excessive performance bond and even a demand for a Parent Company Guarantee as well.

All the above are connected to the question of liability of the contractor. The author's research has pursued different aspects of liability which can be categorised as legal, insurance and financial. Chapter Three was primarily concerned with the legal aspect and

¹³ Panel set up by the ICE to monitor and review developments of the NEC in practice.

¹⁴ Published November 1995 by the ICE.

Chapter Four was concerned with the insurance of the legal aspect of liability. This Chapter focuses on financial limitation of liability.

The research on this subject area concentrated on generic issues such as;

- how standard forms limit the contractor's total financial liability.
- identifying those forms of contract in which the total financial liability is limited.
- identifying the engineering and construction disciplines to which such limits are applied and the reasons governing these practices.
- how standard forms limit liability for risks which are termed 'force majeure' risk events.

The research also included an assessment of the problem of 'consequential losses' and how they are defined. The findings of that area of research are presented separately in Chapter Six. Some of the background to the decision to separate the material in this way warrants further explanation, particularly with regard to the issue of 'force majeure', which forms a significant part of this Chapter.

While drafting the NEC, an early decision of the Working Party was that the term 'force majeure' would not be used within the form because legal advice was that there is no precise definition for it within the English legal system and that the international interpretation of the term was not consistent. However, a relatively cursory review of different UK standard engineering and construction forms of contract showed that some of them, for example Model Form MF/1 (50) and the IChemE Model Forms (52,53), included the term, which suggested that legal advice may not be consistent on this issue and this indicated a need for a more intensive research in this area. The review also revealed other related issues, for example;

- the group of risks that may be categorised as 'force majeure' is not consistent between forms.

- the degree to which the contractor is compensated for these risks may be variable between forms.
- the linkage of these risks with insurance appeared complex and variable between forms.

The author, therefore, identified the following fundamental issues as being central to the research;

- What is 'force majeure' and how is it defined?
- What are 'force majeure' events?
- Which 'force majeure' events are insurable and which ones are not?
- How should the contractor be compensated for 'force majeure' risk events?
- What are the principles that are used or needed to determine compensation for the contractor?

Shortly after the author started conducting his research and prior to the publication of ECC, a task team on limitation of liability was set up by the NEC Panel. Part of the work of the task team has also been to investigate the inclusion of 'force majeure' risk events in Section 8 (the Section which deals with Risks and Insurance) of the NEC. The task team started its work in July 1995 and continued for one year before a consensus was reached. Extensive legal and insurance expertise had to be employed for the task which revealed some of the complexity of the issues for the author. The author's research, however, continued independently of the task team but he had access to its papers through his supervisor and he provided some input to the deliberations of the task team.

5.2 HYPOTHESES

The author conducted his research based on the following hypotheses;

- For achievement of the objectives of NEC of flexibility and of being a multi-disciplinary form of contract, it may require an inclusion of an overall financial limitation of liability for contractors.
- The definition of ‘force majeure’ within standard forms of contract used in the UK is insufficient and inadequate to the extent that it is one of the factors that creates an adversarial climate between the parties to engineering and construction contracts in the construction industry in the UK.

5.3 LITERATURE REVIEW

5.3.1 INTRODUCTION

In this Section, the author outlines the standard forms of contract which limited the liability for contractors in an overall manner and the way this is done by the author is by outlining the relevant clauses which do so. The author also outlines in this Section the legal definition for ‘force majeure’ and the definitions used in standard forms of contract, as well as the clauses which tended to limit the contractors’ liability due to ‘force majeure’ events.

5.3.2 LIMITATION OF LIABILITY IN STANDARD FORMS OF CONTRACT

The expression ‘limitation of liability’ is not only used for limiting the level of legal liability, i.e., ‘reasonable skill and care’ as opposed to ‘fit for purpose’ for provision of design and the works. The liability of the contractor may also be limited, in financial terms, by provision in a contract of a maximum amount payable by the contractor in the case of any event occurring which may render the contractor liable to the employer. If a financial amount is set to that liability, it will also be termed ‘limitation of liability’. A financial amount can be set for several items under a contract. Usually, in contracts, there is a financial amount which is set for delay by the contractor for completion of the works. In NEC, this is known as ‘delay damages’, which form part of ‘liquidated damages’.

Under the ECC (55), liquidated damages for delay are outlined under Secondary Option Clause R which states;

“The Contractor pays delay damages at the rate stated in the Contract Data from the Completion Date for each day until the earlier of

- Completion and
- the date on which the Employer takes over the works.”

The ECC also attempts to limit the contractor’s liability for low performance (liquidated damages for performance) through its Secondary Option Clause S which states;

“If a Defect included in the Defects Certificate shows low performance with respect to a performance level stated in the Contract Data, the Contractor pays the amount of low performance damages stated in the Contract Data.”

Although neither the NEC nor the ECC limited the overall liability for contractors, some clauses within the ECC limit the contractors liability for certain risk events. For example, Clause 21.5 provides a means of limiting the contractors liability to employers for latent defects due to his design, but not his liability in total. It states;

“The Contractor’s liability to the Employer for Defects due to his design that are not listed on the Defects Certificate is limited to the amount stated in the Contract Data in addition to any damages stated in this contract for delay or low performance.”

In other standard forms of contract, there are ones which include clauses that allow an overall financial limit to be set whilst there are others which do not. Examples of forms which include an overall financial limitation of liability include Form MF/1 (50), IChemE Red and Green Books (52,53) and FIDIC (Elec and Mech) 3rd (65). Within Form MF/1, Clause 44.3 states;

“In no circumstances whatsoever shall the liability of the Contractor to the Purchaser under these Conditions for any one act or default exceed the sum stated in the Appendix or if no sum is so stated, the Contract Price. The Contractor shall have no liability to the Purchaser for or in respect or in consequence

of any loss of or damage to the Purchaser's property which shall occur after the expiration of the Defects Liability Period except as stated in Sub-Clause 36.10 (Latent Defects)."

The IChemE Red Book has two clauses that limit the contractors liability financially. Clause 31.8 states;

"The liability of the Contractor for loss of or damage to property of the Purchaser (other than the Plant and Materials but including any section of the Plant as and from its being taken over by the Purchaser) from any cause other than those referred to in Sub-clause 31.9 shall be limited to £1,000,000 (one million pounds) or such other sum as shall be agreed in writing between the Contractor and the Purchaser in respect of any one incident or series of incidents arising from one event."

And Clause 44.2 states;

"The liability of the Contractor to the Purchaser, other than liability arising under Clause 31 (Care of the Works) and 32 (Insurance), shall be limited to damages and reimbursements as prescribed in the Contract and for breach of the Contract. The total liability of the Contractor for damages under Clause 15 (Damages for Delay) and Clause 35 (Performance Tests) shall not exceed the amounts stated in the Form of Agreement through Schedule 8 (Liquidated Damages) if applicable."

The IChemE Green Book has Clause 31.7 similar to Clause 31.8 of the Red Book stating;

"The liability of the Contractor for loss of or damage to the property of the Purchaser (other than the Plant or Materials) arising out of or in connection with the Works shall be limited to £1,000,000 (one million pounds) (or such other sum as may be agreed between the Contractor and the Purchaser) in respect of any one incident or series of incidents arising from one event."

Similarly, within the IChemE Green Book, Clause 44.2 states;

"The total aggregate liability of the Contractor to the Purchaser (other than liability arising under Clause 30 (Care of Works) and 31 (Insurance))

a. for the cost of making good defects in the Plant or Materials under Clause 35 (Liability for Defects);
and

b. for damages for breach of the Contract

shall not exceed the amount stated in the Form of Agreement PROVIDED THAT any sums recovered by the Contractor from Subcontractors under or pursuant to subcontracts, whether as damages, default payments, or costs for breach of contract or under settlements in respect of alleged breach of contract (such settlement to be made only with the consent of the Purchaser, which shall not be unreasonably refused) shall be paid in full to the Purchaser.”

FIDIC (Elec and Mech) 3rd (65) also limits the contractors’ liability financially. Clause 42.2 states;

“The liability of the Contractor to the Employer under these Conditions shall in no case exceed the sum stated in the Preamble or, if no such sum is stated, the Contract Price.”

Other standard forms of contract namely, FIDIC (Civil) 4th (66), ICE 5th (48), ICE 6th (46), ICE Design and Construct (47), GC/Works/1 (49), GC/Works/2 (67), and JCT80 (68) do not have a mechanism for overall limitation of contractors’ liability.

Several observations can be made from the above. Firstly, the fact that only Model Form MF/1, the IChemE forms, and FIDIC (Elec and Mech) 3rd have a mechanism for overall limitation of the contractors’ liability suggests that in practice, a limit for the contractors’ liability is usually set for process plant contracts and for electrical and mechanical works but it is not set for either civil engineering works or building projects.

Secondly, we can see that the way the liability is financially limited between the forms of contract is inconsistent. Model Form MF/1, FIDIC (Elec and Mech) 3rd, and the IChemE forms of contract specify limitations for performance damages and delay damages, and they also state that the contractor is not liable for either loss of or damage to the works after final defects correction certificate or for loss of production or loss of profit (See Chapter Six). However, only Form MF/1 and FIDIC (Elec and Mech) 3rd include one maximum limit to the contractors’ liability that encompasses all events. This is either the sum stated or the contract price, whereas IChemE forms of contract take into account the

liability limitation stated for loss of or damage to the works and the damages which are recoverable by insurance.

IChemE Book Red Book holds the contractor liable for loss of or damage to the works before completion up to an amount (£1,000,000) which may not be the same as the limit of indemnity by insurance. Clause 32.1 (Insurance) within IChemE Red Book states;

“The Contractor shall effect and maintain a policy of insurance with insurers accepted by the Purchaser in the joint names of the Purchaser, Contractor, and all Sub-contractors in respect of any loss of or damage to property of the Purchaser, (other than the Plant and Materials but including taken-over sections of the Plant) arising out of or in connection with the Works, in such sum and for such risks as shall be agreed in writing between the Purchaser and the Contractor in respect of any one incident or series of incidents arising from one event, until the issue of the last Final Certificate.”

However, even though IChemE Green Book has the same effect of holding the contractor liable for loss of or damage to the works before completion up to an amount (£1,000,000), it is the same as the limit of indemnity by insurance. Clause 31.1 of the Green Book states;

“The Contractor shall effect a policy of insurance, with insurers accepted by the Purchaser, in the joint names of the Purchaser, Contractor, and all Sub-contractors in respect of any loss of or damage to property including property of the Purchaser (other than the Plant and Materials) and against liability in respect of death or personal injury to any person (other than employees of the Contractor or Sub-contractors) arising out of or in connection with the performance of the Contract (other than loss, damage, death, or personal injury resulting solely from any of the uninsured (“excepted”) risks set out in the policy of insurance) in the sum of £1,000,000 (one million pounds) or such other sum as may be agreed between the Purchaser and the Contractor in respect of any one incident or series of incidents arising from one event.”

In all other forms of contract, no such sums are stated for the liability of the contractor for loss of or damage to the works before completion even though the contractor is responsible. Presumably, this unlimited liability should not have an effect on the

contractor as he will be indemnified by insurance for any loss of or damage to the employer's works.

5.3.3 FORCE MAJEURE

5.3.3.1 INTRODUCTION

In this Section, the author considers the limitation of liability of contractors for 'force majeure' events. The author starts this Section by describing the origin of the term 'force majeure' in the English legal system. The Section continues with a review of how the term is defined in different standard forms of contract in use in the UK.

5.3.3.2 ORIGINAL LEGAL DEFINITION

Some lawyers seek to differentiate between the two terms 'act of God' and 'force majeure'. In several cases during the nineteenth century, certain risk events were categorised as 'act of God'. Keating (69) showed that it has been decided that if there is an exceptional and extraordinary rainfall¹⁵ or snowfall¹⁶, or flooding¹⁷ or earthquake¹⁸, or other weather "such as could not reasonably be anticipated", it may be an act of God¹⁹.

Keating also shows that 'force majeure' is a term of foreign law which has been introduced into English Contracts²⁰. A statement of its meaning in French law by

¹⁵ Dixon v. Metropolitan Board of Works (1881) 7 Q.B.D. 418

¹⁶ Briddon v. G.N.Railway (1858) 28 L.J.Ex.51

¹⁷ Nichols v. Marsland (1876) 2 Ex.D. 1 (C.A.)

¹⁸ *ibid.*

¹⁹ Fry L.J. in Nitrophosphate and Odams' Chemical Manure Co. v. London & St. Katherine Docks Co. (1878) 9 Ch.D. 503

²⁰ Lebeaupin v. Crispin [1920] 2 K.B. 714

Goirand, approved by McCardie J. in *Lebeaupin v. Crispin* as applying to many English Contracts, says:

“This term is used with reference to all circumstances independent of the will of man, and which it is not in his power to control ... thus war, inundations and epidemics are cases of *force majeure*; it has even been decided that a strike of workmen constitutes a case of *force majeure*”.

Keating also states that ‘*force majeure*’ is wider in its meaning than the phrase ‘act of God’²¹ and it has been said that “any direct legislative or administrative interference would of course come within the term: for example, an embargo²² but “a ‘*force majeure*’ clause should be construed in each case with a close attention to the words which precede or follow it and with due regard to the nature and general terms of the contract. The effects of the clause may vary with each instrument”.

Hudson (54) also differentiates the term ‘*force majeure*’ from the term ‘act of God’ by stating how it was defined in previous cases. It states;

“The expression ‘act of God’ has been variously defined as a circumstance “which no human foresight can provide against, and of which human prudence is not bound to recognise the possibility”²³; as “such an operation of the forces of nature as reasonable foresight and ability could not foresee or reasonably provide against”²⁴; and as “events which cannot be foreseen, or which if they can be foreseen cannot be guarded against”²⁵”.

Hudson also shows that the term ‘*force majeure*’ does not have a precise meaning in English law. It states;

“The term ‘*force majeure*’ does not have any precise meaning, nor does it give rise to any special legal doctrine or consequences in English law, although it is a well-known expression and a considerably more developed concept in French and other law systems. Potentially the expression covers a wider class of

²¹ *Matsoukis v. Priestman* [1915] 1 K.B. 681

²² *Lebeaupin v. Crispin* [1920] 2 K.B. 714

²³ Per Lord Westbury in *Tennent v. Earl of Glasgow* (1864) 2 Macph. (H.L.) 22.

²⁴ Per Atkin J. in *Baldwin's Ltd. v. Halifax Corporation* (1916) 85 L.J.K.B. 1769, at p.1774.

²⁵ Per Lord Coleridge C.J. in *R. v. Commissioners of Sewers for Essex* (1885) 14 Q.B.D. 561, at p.574.

events than ‘Act of God’, since it will include man-made events or interventions, such as strikes or wars or legislation. The expression does not appear to have received judicial interpretation in a construction contract in England.”

If the term ‘act of God’ is to be used in standard forms of contract, then this brief review of legal definition of ‘act of God’ may raise a question as to whether there is universal acceptance as to what may be included as an ‘act of God’. Fortunately, there is no need to risk offending sensitivities by that particular pursuit since it appears that ‘force majeure’ encompasses a broader range of risk.

However, we also find from the legal definition of ‘force majeure’ that it is inclusive of any exceptional weather. At the same time, we find that in most forms of contract, exceptional weather has a separate clause which provides the contractor with compensation as well. Presumably, a dispute could arise if ‘force majeure’ events were also included in the contract with a different level of compensation to the contractor. This suggests two options for clear drafting;

- a) all risks should be compensated for in the same way.
- b) the term ‘force majeure’ should not be used but risks in that category must be very clearly defined without duplicating other risks defined elsewhere. The policies decision could then be made to compensate risks differently.

5.3.3.3 FORMS OF CONTRACT DEFINITIONS

Despite the fact that ‘force majeure’ does not have a precise meaning in the English legal system, drafters of several UK standard forms of contract have tried to define it within those forms. As a result, there are some events which have grown in practice to be known loosely as ‘force majeure’ events. In other forms of contract, these ‘events’ were included but without reference to the term ‘force majeure’. Examples of forms where the term is defined include the Model Form MF/1 (50). In this form, it is stated that ‘force majeure’ means:

- war, hostilities (whether war be declared or not), invasion, act of foreign enemies;
- ionising radiations, or contamination by radio-activity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof;
- pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds;
- rebellion, revolution, insurrection, military or usurped power or civil war;
- riot, civil commotion or disorder;
- any circumstances beyond the reasonable control of either of the parties.

In a similar manner to MF/1, the IChemE forms of contract define the term as a list of events even though the events differ from the list of MF/1. In both cases, the list however is not limiting because it includes 'any circumstances beyond the reasonable control of either of the parties'. Clause 43.1 of the IChemE Red and Green Books ()states;

"Force majeure shall mean any circumstances beyond the reasonable control of a party which prevent or impede the due performance of the Contract including, but not limited to, the following matters;

- a) war or hostilities
- b) riot or civil commotion
- c) earthquakes, flood, fire or other natural physical disaster
- d) denial of the use of any railway, port, airport, shipping service or other means of public transport
- e) strike or lock-out or other industrial action by workers or employers.

The mere shortage of labour, materials or utilities shall not constitute force majeure unless caused by circumstances which are themselves force majeure."

Within the ICE 5th Edition (48), the term 'force majeure' is not mentioned, however, events which may be construed as 'force majeure' events in other forms are listed under the heading 'excepted risks' in Clause 20 (3) which states;

"The "Excepted Risks" are riot war invasion act of foreign enemies hostilities (whether war be declared or not) civil war rebellion revolution insurrection or military or usurped power ionising radiations or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly

or nuclear component thereof pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds or a cause due to use or occupation by the Employer

Similarly, within the ICE 6th Edition (46) and ICE Design and Construct (47), the term 'force majeure' is not mentioned, however, events which may be construed as 'force majeure' events in other forms are also listed under the heading 'excepted risks' in Clause 20 (2) which states;

"Risks for which the Contractor is not liable are loss and damage to the extent that they are due to

- c) riot war invasion act of foreign enemies or hostilities (whether war be declared or not)
- d) civil war rebellion revolution insurrection or military or usurped power
- e) ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof and
- f) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speed"

However, the ICE 5th, 6th and ICE Design and Construct do not mention 'circumstances beyond the control of either party' as an excepted risk.

The FIDIC (Civil) 4th (66) does not contain the term 'force majeure' but Clause 20.4 lists events which are listed in other forms of contract as 'force majeure', as Employer's risks (of which (a), (b), (c), (d), and (e) are termed Special risks in Clause 65). Clause 20.4 states;

"The Employer's risks are:

- a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- b) rebellion, revolution, insurrection, or military or usurped power, or civil war,
- c) ionising radiations, or contamination by radioactivity from any nuclear fuel, or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,
- d) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speed,
- e) riot, commotion or disorder, unless solely restricted to employees of the Contractor or of his Subcontractors and arising from the conduct of the Works,

- f) loss or damage due to the use or occupation by the Employer of any Section or part of the Permanent Works, except as may be provided for in the Contract,
- g) loss or damage to the extent that it is due to the design of the Works, other than any part of the design provided by the Contractor or for which the Contractor is responsible.
- h) any operation of the forces of nature against which an experienced contractor could not reasonably have been expected to take precautions.”

In this case, it may be construed that the list is inclusive of ‘acts of God’ within 20.4(h) even though the term itself is not mentioned.

On the other hand, the FIDIC (Electrical and Mech) 3rd (65) include the term ‘force majeure’ and defines it in Clause 44.1 as follows;

“Force Majeure means any circumstances beyond the control of the parties, including but not limited to:

- a) war and other hostilities, (whether war be declared or not), invasion, act of foreign enemies, mobilisation, requisition or embargo;
- b) ionising radiation or contamination by radio-activity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosives, or other hazardous properties of any explosive nuclear assembly or nuclear components thereof;
- c) rebellion, revolution, insurrection, military or usurped power and civil war;
- d) riot, commotion or disorder, except where solely restricted to employees of the Contractor.”

Within Forms GC/Works/1 (49) and GC/Works/2 (67), ‘force majeure’ events are listed under the heading ‘accepted risks’ in Clause 1(2) which states;

“ ‘the accepted risks’ means the risks of-

- a) fire or explosion
- b) storm, lightning, tempest, flood or earthquake,
- c) aircraft or other aerial devices or objects dropped therefrom, including pressure waves caused by aircraft or such devices whether travelling at sonic or supersonic speeds,
- d) ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel,
- e) the radioactive, toxic, explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof,

f) riot, civil commotion, civil war, rebellion, revolution, insurrection, military or usurped power of King's enemy risks (within the definition of that expression contained in section 15(1)(a) of the War Risks Insurance Act 1939 as for the time being in force)."

JCT80 (68) neither mentions the term 'force majeure' nor lists 'force majeure' events under any other heading. However, Clause 32 allows for events in case of outbreak of hostilities (whether war is declared or not). And Clause 21.3 limits the contractors liability for 'excepted risks-nuclear perils etc.';

"Notwithstanding the provisions of clause 20.2 or clauses 21.1 and 21.2, the Contractor shall not be liable either to indemnify the Employer or to insure against any damage, loss or injury caused to the Works, the site, or any property, by the effect of ionising radiations or contamination by radioactivity from any nuclear fuel or from any nuclear waste from the combustion of nuclear fuel, radioactive toxic explosive or other hazardous properties of any explosive nuclear assembly or nuclear component thereof, pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds."

Finally, ECC (55), which does not mention the term 'force majeure'. However, part of Clause 80.1 states that the Employer's Risks are loss of or damage to the works, Plant and Materials due to

- war, civil war, rebellion, revolution, insurrection, military or usurped power.
- strikes, riots and civil commotion not confined to the Contractor's employees.
- radioactive contamination.

From the above, we can notice that there are several differences in the way standard forms of contract defined 'force majeure';

Firstly, different terms from 'force majeure' are used in some forms of contract. For example, the term is used in Form MF/1, IChemE Forms and FIDIC (Elec and Mech) 3rd but the terms 'excepted risks' within the ICE Conditions of Contract, 'accepted risks' within Forms GC/Works, and 'special risks' within FIDIC(Civil)4th are used instead. This is probably due to the fact that 'force majeure' does not have a precise meaning in

English Law and therefore there is no necessity to use the term universally for all forms of contract.

Secondly, there are subtle differences in wording between clauses. For example, the expression “*whether war be declared or not*” associates the risk of war in all forms of contract with the exception of the IChemE forms of contract. Also, in many forms of contract, we find “*pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds*” whereas Forms GC/Works have “*aircraft or other aerial devices or objects dropped therefrom, including pressure waves caused by aircraft*”. Legally, there may be certain implications by adopting these different terminologies.

Thirdly, the contents of the lists of ‘force majeure’ is different between the forms of contract. For example, invasion, act of foreign enemies and usurped power are included in all lists except in the list of the IChemE forms. We also find that strike (which is not necessarily confined to contractor’s employees) is included in the list of IChemE forms whereas it is not in other forms of contract.

The author will further analyse and discuss the above observations in Section 5.7.2. Within the subsequent Section 5.3.3.4, the author outlines the clauses that allow compensation for the contractor for ‘force majeure’ risk events.

5.3.3.4 COMPENSATION FOR FORCE MAJEURE CLAUSES IN FORMS OF CONTRACT

It should be noted that the compensation clauses shown below correspond to the risk events shown on the lists outlined above in Section 5.3.3.3. In Model Form MF/1, the contractor is compensated for loss or damage to the works by Clause 43.3 which states;

“In the event that any part of the Works shall suffer loss or damage whilst the Contractor has responsibility for the care thereof which is caused by any of the Purchaser’s Risks the same shall, if required by the Purchaser within six months after the happening of the event giving rise to loss or damage, be made good by the Contractor. Such making good shall be at the expense of the Purchaser at a price to be agreed between the Contractor and the Purchaser. In default of agreement such sum as is in all circumstances

reasonable shall be determined by Arbitration under Clause 52 (Disputes and Arbitration). The price or sum so agreed or determined shall be added to the Contract Price.”

However, there is an exclusion for the contractors’ compensation which appears in Clause 45.1 which states;

“The Purchaser’s Risks’ are:

Force Majeure except to the extent insured under the insurance policies to be effected by the Contractor in accordance with Clause 47 (Insurance).”

The contractor is compensated for delay by Clause 46.2 which states;

“If either party is prevented or delayed from or in performing any of his obligations under the Contract by Force Majeure, then he may notify the other party of the circumstances constituting the Force Majeure and of the obligations performance of which is thereby delayed or prevented, and the party giving the notice shall thereupon be excused the performance or punctual performance, as the case may be, of such obligation for so long as the circumstances of prevention or delay may continue.”

Alternatively, the contractor may be compensated by Clause 33.1 which states;

“If, by reason of any variation ordered pursuant to Clause 27 (Variations) or of any act or omission on the part of the Purchaser or the Engineer or of any industrial dispute or by reason of circumstances beyond the reasonable control of the Contractor arising after the acceptance of the Tender, the Contractor shall have been delayed in the completion of the Works, whether such delay occurs before or after the Time for Completion, then provided that the Contractor shall as soon as reasonably practicable have given to the Purchaser or the Engineer notice of his claim for an extension of time with full supporting details, the Engineer shall on receipt of such notice grant the Contractor from time to time in writing either prospectively or retrospectively such extension of the Time for Completion as may be reasonable.”

The IChemE Red Book excludes the liability of the contractor to some ‘force majeure’ risks by Clause 31.4 which states;

“The Contractor shall be liable for and bear the Cost and Expense of making good loss or damage as specified in Sub-clauses 31.2 and 31.3 for any one incident or series of incidents arising from one event up

to the replacement value of the Plant or such other amount as may be agreed in writing between the Purchaser and the Contractor pursuant to Sub-clause 32.1(a) provided that nothing in this sub-clause 31.4 shall

(c) impose a liability on the Contractor to make good at his own Cost and Expense any loss or damage that may result solely from

(i) war or hostilities

(ii) radio-active contamination

(iii) any design or information provided by the Purchaser

(iv) any wrongful or negligent act or omission of the Purchaser, his servants or agents.”

Compensation for delay is by Clause 14 which states;

“14.1 If the Contractor shall be delayed in the performance of any of his obligations under the Contract by any of the matters specified in Sub-clause 14.2, he shall forthwith give notice thereof to the Engineer and shall become entitled to such extension of any date or period specified in the Contract for the completion or doing of anything by the Contractor as shall in all the circumstances be fair and reasonable. The Engineer shall, as soon as the extent and consequence of any such delay are known, grant such extension by notice both to the Purchaser and to the Contractor. A notice given by the Contractor under Clause 43 (Force Majeure) shall also constitute a notice under this sub-clause.

14.2 The Matters of delay entitling the Contractor to an extension of date or period under this clause are:

(d) delay caused by force majeure as defined in Clause 43 (Force Majeure).”

There is no clause that compensates the contractor for any loss of or damage that may occur due to ‘force majeure’ risks within the IChemE Green Book however, the contractor is compensated for delay by Clause 15.1 which states;

“If the Contractor shall be delayed in the performance of any of his obligations under the Contract by any matter not under his reasonable control (including an instruction by the Engineer), which affects the programme of work, he shall forthwith give notice thereof to the Engineer and shall become entitled to such extension of any date or period specified in Schedule 4 (Times of Completion) as shall in all the circumstances be fair and reasonable, and Schedule 4 shall be amended accordingly.

A notice given by the Contractor under Clause 43 (Force Majeure) shall also constitute a notice under this sub-clause.”

The ICE Conditions (5th, 6th and Design and Construct) have a similar Clause that compensates the contractor for any loss of or damage to the works. Clause 20(3)(b) states;

“Should any loss or damage arise from any of the Excepted Risks defined in sub-clause (2) of this Clause the Contractor shall if and to the extent required by the Employer’s Representative rectify the loss or damage at the expense of the Employer.”

The contractor is compensated for delay by Clause 44. Clause 44(1) states;

“Should the Contractor consider that

- (a) any variation ordered under Clause 51(1) or
- (b) any cause of delay referred to in these Conditions or
- (c) exceptional adverse weather conditions or
- (d) other special circumstances of any kind whatsoever which may occur

be such as to entitle him to an extension of time for the substantial completion of the Works or any Section thereof he shall within 28 days after the cause of any delay has arisen or as soon thereafter as is reasonable deliver to the Employer’s Representative full and detailed particulars in justification of the period of extension claimed in order that the claim may be investigated at the time.”

Similarly, the FIDIC (Civil) 4th compensates the contractor for any loss of or damage to the works by Clause 20.3;

“In the event of any such loss or damage happening from any of the risks defined in Sub-Clause 20.4, or in combination with other risks, the Contractor shall, if and to the extent required by the Engineer, rectify the loss or damage and the Engineer shall determine an addition to the Contract Price in accordance with Clause 52 and shall notify the Contractor accordingly, with a copy to the Employer. In the case of a combination of risks causing loss or damage any such determination shall take into account the proportional responsibility of the Contractor and the Employer.”

And Clause 44.1 for delay by stating;

“In the event of

- (a) the amount or nature of extra or additional work, or
- (b) any cause of delay referred to in these Conditions or
- (c) exceptional adverse climatic conditions or
- (d) any delay, impediment or prevention by the Employer, or
- (d) other special circumstances which may occur, other than through a default of or breach of contract by the Contractor or for which he is responsible,

being such as fairly to entitle the Contractor to an extension of the Time for Completion of the Works, or any Section or part thereof, the Engineer shall, after due consultation with the Employer and the Contractor, determine the amount of such extension and shall notify the Contractor accordingly, with a copy to the Employer.”

FIDIC (Elec and Mech) 3rd compensates the contractor for ‘force majeure’ events by Clause 44.5 and Clause 44.6 which state;

“44.5 If the Contractor incurs additional costs in complying with the Engineer’s directions under Sub-Clause 44.4, the amount thereof shall be certified by the Engineer and added to the Contract Price.”

“44.6 If in consequence of Force Majeure the Works shall suffer loss or damage the Contractor shall be entitled to have the value of the work done, without regard to the loss or damage that has occurred, included in a Certificate of Payment.”

Clause 26.1 compensates the contractor for delay and it is inclusive of ‘force majeure’ events;

“The Contractor may claim an extension of the Time for Completion if he is or will be delayed in completing the Works by any of the following causes:

- (a) extra or additional work ordered in writing under Clause 31,
- (b) exceptional adverse weather conditions,
- (c) physical obstructions or conditions which could not reasonably have been foreseen by the Contractor,
- (d) Employer’s or Engineer’s instructions, otherwise than by reason of the Contractor’s default,
- (e) the failure of the Employer to fulfil any of his obligations under the Contract,
- (f) delay by any other contractor engaged by the Employer

- (g) any suspension of the Works under Clause 23, except when due to the Contractor's default,
- (h) any industrial dispute,
- (i) the Employer's Risks.
- (j) Force Majeure."

Within GC/Works/1, the contractor is compensated for loss of or damage to the works by Clause 26(2)(b) which states;

"The cost of making good such loss or damage shall be wholly borne by the Contractor, save that-

(ii) where the loss or damage is wholly caused by any of the accepted risks the Authority shall pay the Contractor for making good the loss or damage and where it is partially so caused the Authority shall pay the Contractor such sum as is proportionate to the share of any of the accepted risks in causing the loss or damage."

And he is compensated for delay by Clause 28(2) which states;

"The Contractor shall be allowed by the Authority a reasonable extension of time for the completion of the Works in respect of any delay in such completion which has been caused or which the Authority is satisfied will be caused by any of the following circumstances-

- (a) the execution of any modified or additional work;
- (b) weather conditions which make continuance of work impracticable
- (c) any act or default of the Authority;
- (d) strikes or lock-outs of workpeople employed in any of the building, civil engineering or analogous trades in the district in which the Works are being executed or employed elsewhere in the preparation or manufacture of things for incorporation;
- (e) any of the accepted risks; or
- (f) any other circumstance which is wholly beyond the control of the Contractor."

Similarly, GC/Works/2 compensates the contractor for loss of or damage to the works by Clause 14(2)(b) which states;

"The cost of making good such loss or damage shall be wholly borne by the Contractor, save that-

(ii) where the loss or damage is wholly caused by any of the accepted risks the Authority shall pay the Contractor for making good the loss or damage and where it is partly so caused the Authority shall pay the

Contractor such sum as is proportionate to the share of any of the accepted risks in causing the loss or damage.”

And for delay by Clause 16(2) which states;

“The Contractor shall be allowed by the Authority a reasonable extension of time for the completion of the Works in respect of any delay in such completion which has been caused or which the Authority is satisfied will be caused by any circumstance which is wholly beyond the control of the Contractor:

Provided that it shall be the duty of the Contractor at all times to use his best endeavours to prevent any delay being caused by any such circumstance and to minimise any such delay as may be caused thereby and to do all that may reasonably be required, to the satisfaction of the SO, to proceed with the Works.”

JCT80 compensates the contractor for loss of or damage to the works due to war risk in Clause 33.1 which states;

“In the event of the Works or any part thereof or any unfixed materials or goods intended for, delivered to and placed on or adjacent to the Works sustaining war damage as defined in clause 33.4 then notwithstanding anything expressed or implied elsewhere in this Contract:

33.1.1 the occurrence of such war damage shall be disregarded in computing any amounts payable to the Contractor under or by virtue of this Contract.

33.1.3 the Contractor shall reinstate or make good such war damage and shall proceed with the carrying out and completion of the Works, and the Architect shall in writing fix such later Completion Date, in his opinion, is fair and reasonable.”

The author summarises the relevant clause numbers in Table 2 below.

Form of Contract	Contractor entitled for extra cost for rectifying loss of or damage to the works	Contractor entitled to extension of time
MF/1	Clause 43.3 (unless insured(Clause 45.1))	Clause 33.1, Clause 46.2
IChemE Red Book	Clause 31.4(c)*	Clause 14.1, Clause 14.2(d)
IChemE Green Book	²⁶	Clause 15.1
ICE 6th	Clause 20(3)(b)	? (Clause 44)
ICE 5th	Clause 20(2)	? (Clause 44)
ICE Design and Construct	Clause 20(3)(b)	? (Clause 44)
FIDIC (Civil) 4th	Clause 20.3	? (Clause 44.1)
FIDIC (Elec and Mech) 3rd	Clause 44.5	Clause 26.1(j)
GC/Works/1	Clause 26(2)(b)(ii)	Clause 28(2)(e)
GC/Works/2	Clause 14(2)(b)(ii)	Clause 16(2)
JCT80	Clause 33.1.1	Clause 33.1.3
ECC	Clause 60.1(14)	Clause 60.1(14)

* The Clause includes as force majeure events war and hostilities and radio-active contamination only. However, radio-active contamination is not included in the original list of force majeure events.

Table 2 : Compensation Clauses for Force Majeure Events

Table 2 shows that in all forms of contract, the loss of or damage to the works will be rectified by the contractor at the expense of the employer. In all the above mentioned clauses, the contractor is entitled to be paid the extra costs and expenses with the exception of the IChemE Red Book. This form of contract seems to be the only form of contract that does not entitle the contractor to the extra cost for rectifying loss of or damage to the works in the case of its listed 'force majeure' events with the exception of war and hostilities where the contractor is paid in that case. However, similar to the other forms of

²⁶ Cost-reimbursable contract. Therefore the contractor gets compensated anyway.

contract, it entitles the contractor to extra cost in the case of radio-active contamination but it should be noted that this risk is not considered 'force majeure' in this form.

5.4 LIMITATION OF LIABILITY IN PRACTICE

There seems to be a noticeable discrepancy in the construction industry regarding overall financial limits to the liability of contractors and subcontractors under contracts (see Appendix C, Table 2 and Appendix D, Table 10). These industry surveys show that there is a large number of contractors (about 40% of the research sample) who do not have their liability financially limited. Even though the liability limitation does not extensively exist at the moment in the construction industry, apart from offshore contracts where no contractor will be able to accept unlimited financial liability, there are writers who acknowledged the need for an overall limit to the contractors' liability which does not exist in general for all contractors and subcontractors. For example, Goudsmit (44) stated that;

“although the employer may wish to load the turnkey contractor with all imaginable and unimaginable risks and liabilities, there are practical limits to such wishes. Consequently we have to investigate what limits can be set and how they can be explained. The simplest and clearest way to limit liabilities is to price them. A clause can be incorporated in the contract which, apart from defining risks and liabilities and allocating them to the parties, sets a ceiling to the amount either cumulatively or per case, which may be spent on repair of damages or as compensation.”

In terms of the legal ability to limit liability, we find that it is possible subject to the test of 'reasonableness' as laid down by the Unfair Contract Terms Act 1977 and if it is only for loss of or damage to property rather than personal injury or death. Jess (42) states;

“Pondering on his potential liabilities to clients and others relying upon his advice and skill, the professional person is bound to ask himself whether the law will permit him to exclude or limit his professional liabilities by notice to those likely to be affected. A reading of *Hedley Byrne & Co Ltd v. Heller & Partners Ltd* [1964] might lead one to believe that this can be done by an express exclusion of responsibility, as protected the defendant bankers in that case. Since that decision, however, statute has intervened in the shape of the Unfair Contract Terms Act 1977.

Any contractual term or any notice or communication, which purports to exclude or limit a professional's liability in respect of personal injury or death arising from a breach of professional duty will be of no effect at all. In the case of other loss or damage, the defendant professional will only be able to rely on such term or notice to the extent that he shows the court that it is 'reasonable'."

However, interview data (see interview 3, p.3/4) shows that between companies, almost every agreement can be regarded as 'reasonable'. It would certainly be reasonable for a contractor to limit his liability to a pre-determined figure. It also shows an important legal distinction between limiting overall liability and liquidated damages. Limiting liability does not provide the employer an automatic right to deduct it because he would still have to prove through arbitration or litigation the extent of his loss. Whereas, liquidated damages are in fact a pre-estimate of actual loss and gives the employer the right to deduct it immediately.

Interview data shows that the interviewees did not possess much knowledge of the issue of financial limitation on contractor's liability. There did not seem to be much familiarity with an overall limit. However, there has been familiarity with other limitations, for example, for delays. This can also apply to some process plant contracts. One of the interviewees were clients whose contracts were mainly process plant. There has been general agreement on that the contractor's liability is usually unlimited. However, one civil contractor stated that the company has an overall limit of £50m. but it is not limited on a contract to contract basis. This means that this limit is not written in any of their contracts but under no circumstance will their liability payment exceed that amount per contract.

Interview data (see interview 3, p.3/4) shows that it is more common in mechanical engineering contracts that small contractors and subcontractors may require their liability for performance liquidated damages to be limited. The usual formula is to limit their liability to simply replacing the defective work. For example, a factory may be designed and built and the liability could be limited to simply replacing a certain defective part. Within a few months of operation, the electricity supply may fail, for example, due to the

switch board at the main of the transformer which distributes the electricity blowing up. Under contract terms, the liability would be simply to replace the switchboard. However, for the building owner, he may have lost two to three days production. That is one way of a contractor attempting to limit his liability. The other way for the contractor to limit his liability is to state that the contract is worth £1,000,000 and that he would pay all the damages up to a limit of say £100,000.

Interview data (see interview 3, p.3/4) also shows that, in practice the contractor may only be sued for a limit which equals his limit of indemnity provided by his Professional Indemnity Insurance. If the contractor has a limit of indemnity of £2,000,000, then it may be impractical for another party to sue for more than this limit.

It seems from the literature, therefore, that for civil engineering and building disciplines, there is no financial limitation for the contractor's liability whereas for mechanical and electrical works and process plant, the limitation exists. This is also ascertained by the NEC Panel papers where we find that Chandler (70) states that financial liability is generally not limited in normal building and civil work but is limited, for example, in the offshore industry. He states that the reason for that is clearly that the level of risk in the offshore industry is potentially much greater than any contractor in his right mind will accept. This, however, does not explain why contractors did not have financial 'cap' on their liability in civil and building. Also, there does not seem to be a reason why they cannot have a financial 'cap'.

Nevertheless, we also find other commentators, for example, Baird (71) who state;

"To rely on the view that such clauses are 'not normal' in a civil and building contract is a bit like saying we intended NEC to be a contract for the whole construction industry but in reality it is just another contract for risk free 'green field' civil works.

It should be noted that limitation of liability has nothing to do with civil, building, mechanical, electrical or any other discipline. It is to do with the risks a contractor is exposed to by working for the particular

employer he has a contract with. Constructing a new motorway across Rannoch Moor may be technically challenging and full of risks for the contractor and his resources but the contractor's exposure to the employer is virtually risk free beyond the usual requirements of contract time and performance. However, constructing a new 270m high slid-concrete chimney adjacent to several million pounds worth of existing precipitator and boiler plant within a fixed period plant outage carries substantial risks which no contractor can carry. It is still civil works."

The author suggests that there may be another pragmatic reason, apart from the level of risk, for the discrepancy in the practice between disciplines. Privatisation is a recent concept in the UK. Prior to it, M&E and process plant seemed to be predominantly private sector while civil works and building tended to be public sector works. In the private sector, a contractor risks a higher chance of his liabilities being brought to the forefront. Unlike public works and public sector employers, there is a higher chance that a private sector employer will require compensation for all his losses in accordance with all the liabilities of the contractor. Contractors, therefore, seek to 'cap' their liabilities for M&E and process plant more than they would for civil works and building.

5.5 FORCE MAJEURE IN PRACTICE

Even though interview data (for example, see interview 12, p.12/10) shows that normally in UK standard forms, the contractor is compensated for delay only without extra costs for 'force majeure' events, the author has found that in all forms of contract, the loss of or damage to the works will be rectified by the contractor at the expense of the employer. In all the clauses mentioned in Table 2 above, the contractor is entitled to be paid the extra costs and expenses with the exception of the IChemE Red Book. This form of contract seems to be the only form of contract that does not entitle the contractor to the extra cost for rectifying loss of or damage to the works in the case of its listed 'force majeure' events with the exception of war and hostilities where the contractor is paid in that case. It also does, however, entitle the contractor to extra cost in the case of radioactive contamination. It should be noted that the risk of radio-active contamination is not considered as 'force majeure' in IChemE Red Book.

In some forms of contract, the clause that entitles the contractor to extra time is drafted in such a manner that it states clearly that the entitlement is in the event of ‘force majeure’ occurring. In other forms, however, this is not the case. Clause 44(1) of the ICE Conditions (5th, 6th and Design and Construct) states;

“ Should the Contractor consider that

(a).....

(b).....

(c).....

(d) other special circumstances of any kind whatsoever which may occur

be such as to entitle him to an extension of time

Clause 44.1 of the FIDIC Conditions for Civil is drafted in a similar manner. Clause 33.1 of MF/1 has the same effect but MF/1 has an additional Clause 46.2. Unlike the other clauses within other forms of contract where it is clear that the extra time is for ‘force majeure’. For example, within MF/1 Clause 46.2 states;

“ If either party is prevented or delayed by Force Majeure, then

The ‘excepted risks’, therefore, which are outlined in the ICE Conditions may not be construed as ‘*other special circumstances of any kind whatsoever which may occur*’.

Despite the legal definitions and the definitions outlined in standard forms of contract, interview data shows that practitioners within the construction industry do not have the same perception about the term ‘force majeure’ nor do they regard the way it is defined in standard forms as sufficient and adequate. For example, one interviewee (see interview 8, p. 8/9) stated it as follows;

“force majeure’s definition is awkward. It tends to vary. From the point of view of lawyers, force majeure’s definition varies from day to day. Broadly speaking, it could be put as those issues that may not have reasonably been anticipated as happening.”

However, the author is of the opinion that if they were just regarded as issues that may not have reasonably been anticipated as happening, then other risk events such as unforeseen physical obstructions may also be seen as 'force majeure'. Indeed, if the term is to be used in forms of contract, then a specific and precise definition is needed. This view has also been stated by practitioners within the industry (for example, see interview 12, p.12/10).

The insufficiency of the definition of 'force majeure' events leads to other problems within the construction industry. A consequence of the inability of practitioners to define 'force majeure' precisely is that it helps assist the adversarial climate between the parties to construction contracts. An example of a client's statements are outlined below (see interview 6, p.6/13);

“‘Force majeure’ seems to be the contractor’s cop-out. For him, it means anything he wants it to mean. Basically, ‘force majeure’ should be restricted to those items which are beyond the control of either party to the extent that neither party could have foreseen them for them to be dealt with upfront (also taking into account the extent of control of their effects once they have occurred). For example, an industrial dispute outside the site might be ‘force majeure’ but an industrial dispute on the site is not ‘force majeure’ because it would fall within the control of the contractor. But then it could be an industrial dispute which is outside the site but within the industry sector which this contractor is within and therefore has a big influence over that. Then it could be argued that the effects could be mitigated. So, whilst people are trying to define it, the effects are very important.

We tend to avoid the term ‘act of God’ because it does not have a specific meaning. It needs to be stated specifically what is meant. Some might say an ‘act of God’ is tempest or a phenomenal earthquake. It is better to state a phenomenal storm or an earthquake rather than ‘act of God’. There is no need to use vagueness.

Also, a ‘force majeure’ event must be something akin to an event that would give rise to the contract being deemed to be frustrated. It must be so serious that it is almost worth calling the whole job off. It could be an earthquake but if the job is within an earthquake zone, then it is reasonable to assume that it will happen. So, what is ‘force majeure’? It is related to definable events but also it only has consequences in defined areas. People tend to forget that it is ‘definable’ and they use phrases to avoid defining it. I take the view (which would differ from a contractor’s view) that an industrial dispute is

under no circumstances 'force majeure' because if it affects the contractor then he has some influence and ability to prevent it happening because it is usually his own workforce."

The brief review of legal definition of 'act of God' and 'force majeure' immediately raises interesting issues in relation to handling such risks within contracts. At a trivial level, one could ask whether there is an internationally acceptable phrase for an act of 'God'.

Also, we find from the legal definition of 'force majeure' that it is inclusive of any exceptional weather. However, we also find that in most forms of contract, exceptional weather has a separate clause which provides the contractor with compensation as well. Presumably, a dispute could arise if 'force majeure' events were also included in the contract with a different level of compensation to the contractor. This suggests two options for clear drafting;

- a) all risks should be compensated for in the same way.
- b) the term 'force majeure' should not be used but risks in that category must be very clearly defined without duplicating other risks defined elsewhere. The policy decision could then be made to compensate risks differently.

5.6 INSURANCE OF FORCE MAJEURE EVENTS

Another source of confusion about 'force majeure' events is that generally some of them tend to be grouped together by the insurance market and partially regarded as 'trade' risks (risks which are not insurable by the insurance market). However, interview data (see interview 9, p.9/12) shows that it may be possible to insure the effects of 'force majeure' but it is not cheap and excesses are normally very high. It also shows that major contractors do not normally buy it. However, further interview data (see interview 11, p.11/3) states that the effects of 'force majeure' are not insurable.

The interview data suggests that stating that 'force majeure' is not insurable is a simplification of the overall picture. It appears that the insurability of 'force majeure' events is dependant on several factors;

- a) which event is causing the effects?
- b) what is the nature of the loss?
- c) if it is loss or damage, to what is it occurring?
- d) to which party is the loss occurring?

The author derived Table 3 from his interview data. It is shown below and it attempts to categorise the general insurability of 'force majeure' events in accordance with the factors shown above. The author does so by listing different 'force majeure' events and by showing the insurability of their different effects.

Force Majeure Event	Costs of rectifying loss of or damage to works, materials, plant, and equipment		Costs of loss of or damage to marine, air transit and hull	Delay costs to the contractor	Delay costs to the employer
	by insurance market	by the government			
Strike confined to contractor's employees*	Y		Y	N	Y
Riots and civil commotion	Y		Y	-	Y
Pressure waves caused by aircraft or other aerial devices	Y		Y	-	Y
Earthquake, flood and fire	Y		Y	-	Y
Changing government or changing government legislation**	-		-	dependant on legislation	Y
	by insurance market	by the government	by insurance market		
Ionising radiations, radio-active contamination	N	Y	Y	-	Y
War	N	Y	Y	-	Y
Civil war	N	Y	Y	-	Y
Rebellion	N	Y	Y	-	Y
Insurrection	N	Y	Y	-	Y
Military or usurped power	N	Y	Y	-	Y
Invasion	N	Y	Y	-	Y
Act of foreign enemies	N	Y	Y	-	Y
Strike not confined to contractor's employees	N	Y	Y	-	Y
Terrorism	Y (but limited)	Y (via Pool-Re)	Y	-	Y

*Risk normally carried by contractor.

**Risk may be carried by either party depending on form of contract.

Table 3 : Insurability of Force Majeure Events

Key to Table 3 : Insurability of Force Majeure Events

Y - yes, the risk is insurable.

N - no, the risk is not insurable ('trade' risk).

Interview data (see interview 11, p.11/9) shows that the events listed in Table 3 from 'ionising radiations and radio-active contamination' until 'strikes not confined to contractor's employees' are *largely* not insurable by the market for the costs of rectifying

any loss of or damage that may occur to the works, plant, materials and equipment. They are insurable, however, for costs of losses of or damage to air and marine transit and hull. Transit is the marine cargo coverage. If there is cargo on a vessel or on a plane, the actual cargo will be insured. The insurance that covers the cargo or goods can, by additional payment, include more risks. Equally, the insurance that covers the plane or the vessel, can also cover, for example, the war risk. That coverage is bought as a separate part of the policy under separate clauses and there is an additional payment for it. However, the insurability is dependant upon the country and area. For example, in some parts of the World, where there is a war, all the effects of war would not be insurable.

However, even though every policy has a war exclusion on it, interview data (see interview 9, p.9/13) shows that in theory, the party may approach the government. The interviewee stated that they faced this problem during the Gulf war in 1991 and the British Government did enact. There is an Act of Parliament in the UK where they are supposed to enact which makes them responsible for losses as a result of war damage.

Interview data (see interview 11, p.11/3) shows that the costs of loss of or damage to the works from terrorism are normally insurable around the World and it was insurable in the UK until around 1992-1993. However, due to the massive attack by the IRA (Irish Republican Army) on the City of London, the commercial insurance market in the UK stated that they could no longer provide the insurance because the exposure is too massive. Covers were therefore limited on any policy to £100k. As a result, the government organised what is known as 'Pool-Re'. Pool-Re is a combination of all the property insurers in the UK, together in a pool re-insuring the terrorism risk separately from the ordinary insurance. Therefore, the insurer that holds, for example, the fire insurance on a certain building, will have given coverage for the ordinary loss or damage plus £100k for terrorism. Beyond this value, if terrorism coverage for the full value of the building is sought, Pool-Re provides it. However, for administration purposes, the additional coverage from Pool Re will be handled by the insurers who are providing the ordinary coverage. The insurers will seek the coverage from Pool-Re and sell it, and it is separately charged for and separately rated. Pool-Re could be thought of as a separate insurance company which has been

guaranteed or re-insured by the government. Thus the commercial market has a limit to the amount it will pay in any one year if it is liable for terrorism loss. Beyond that amount, the government provides compensation which will be in the form of insurance through reimbursing Pool-Re.

Interview data (see interview 9, p.9/13) also shows that costs due to loss of or damage to the works due to strikes confined to contractor's employees are insurable by the normal commercial insurance market, however, if there are any delay costs, then this part would be regarded as a 'trade' risk. However, interview data (see interview 9, p.9/13, interview 11, p.11/9) also shows that all the effects of riots and civil commotion are insurable by the insurance market.

Interview data (see interview 9.p. 9/12) also shows that insurance for effects on the contractor's liability resulting from a government change or changes in government legislation will be dependant on the nature of the change in legislation. For example, a change in government may result in a major shift in the strategy for the projects under the PFI (Private Finance Initiative). This type of risk would not be insurable or if it is, then the expense will be to the extent that even major contractors would consider not insuring it.

However, further interview data (see interview 11, p.11/9) shows that the government could impose strict liabilities and those may be insurable. For example, the CDM (Construction Design and Management) Health and Safety Regulations 1994 imposed a more strict liability upon the employers' duty of care towards their employees. An employers liability insurance provides an employer with an indemnity for the liability he has towards his employee should they suffer injury or death at work and their cause of action is largely based upon the Health and Safety Regulations. The burden of proof is not of negligence but the easier one of breach of the Regulations.

5.7 SUMMARY AND CONCLUSIONS

5.7.1 SUMMARY

The research findings may be summarised as follows;

- The NEC does not limit the overall financial liability for contractors.
- Standard forms of contract for mechanical and electrical works and process plant limit the overall financial liability for contractors whereas forms for civil engineering works and building do not.
- The way the liability is financially limited between the forms of contract is inconsistent.
- The overall financial limitation of liability of contractors is not required by all sectors of the construction industry.
- The limitation exists in offshore industry contracts for the main reason that no contractor will be able to accept unlimited financial liability.
- Legally, limiting liability is possible subject only to the test of 'reasonableness'.
- The term 'force majeure' is not used in all forms of contract and this could be mainly due to the fact that the term does not have a precise meaning in English Law.
- Legal definitions of 'act of God' and 'force majeure' are too wide. They can be interpreted as inclusive of various risk events which may not necessarily be 'force majeure' events.
- 'Force majeure' events differ between one form of contract and the other.
- Some forms of contract do not limit their definition of 'force majeure' by including, for example, 'any circumstances beyond the control of either party'.
- In forms of contract, the contractor is entitled to both time and money in case of 'force majeure' events.
- Practitioners within the construction industry do not have a consistent perception about either the term 'force majeure' or 'act of God'.

- The insurability of the effects of 'force majeure' is dependant on what the insurance is provided for and therefore it is too simplistic to suggest that 'force majeure' events are uninsurable.

5.7.2 CONCLUSIONS

The NEC does not limit the overall financial liability for contractors. However, for the achievement of its objectives of flexibility and of being multi-disciplinary form of contract, it requires an inclusion of an overall financial limitation. The model to be adopted in NEC can take into account the inconsistencies between the way the liability is limited in other forms of contract. In addition to the limitations for performance damages and delay damages, the model can also specify a limitation for loss of production and loss of profit in a similar manner to Model Form MF/1. It can also have a provision for a maximum limit to the contractor's liability that encompasses all events which could either be the sum stated or the contract price. This, however, should be subject to the maximum limit of indemnity provided by insurance.

Since an overall financial limitation of liability is not required by all sectors of the industry, this model could be incorporated in NEC as an optional clause.

The author believes that, ultimately, this model will increase the flexibility of NEC as more contractors, particularly the ones who undertake mechanical and electrical works and process plants, will feel more protected in using NEC.

Concerning 'force majeure' events, the author has identified a variety of definitions and methods of treatment. There are many factors which combine to make 'force majeure' events contribute to the adversarial climate in the industry. The need for a precise definition of these risk events is necessary, although the usage of the term 'force majeure' may not be necessary as it has no precise meaning in law nor a commonly accepted definition within the construction and insurance industries. An adequate

procedure is also needed for dealing with these events if they occur and it should take into account their insurability.

The fact that there is no precise meaning of the term 'force majeure' in the legal system nor a common definition in the industry may not be an issue in itself. However, it cannot be ignored because several implications have been built upon the term itself, for example, the commercial market does categorise these events and their insurability under the heading 'force majeure'.

The NEC, therefore, needs a model that clearly defines 'force majeure' events. This can be achieved by a comprehensive list that takes into account all events that may be regarded as 'force majeure', with an allocation to the employer in accordance with the principle that risks that are beyond the control of either party should be carried by the employer. The model, however, should also take into account the insurability of the individual events. If a 'force majeure' event is insurable, then the contractor should be compensated with time only.

5.7.3 RECOMMENDATIONS FOR FUTURE WORK

Further work can research the effect of the model of limiting the contractor's liability financially in the NEC on those contractors who undertake civil and building work and who are not used to overall financial limitation.

Further work on 'force majeure' is needed to investigate the extent of availability of insurance of loss of or damage to the works due to such events. So far, the research has identified that this is largely not insurable by the insurance market for the costs of loss of or damage to the works, however, the possibility of insurance has not been ruled out depending on the cycle of the market. Further work can investigate if changes in the commercial insurance market and movement between its hard and soft cycles can have any effect on the extent of insurability of 'force majeure' events.

CHAPTER SIX: CONSEQUENTIAL LOSSES

6.1 INTRODUCTION

Initial research by the author into the database of comments compiled while drafting the NEC has revealed that the industry and its legal advisers have conflicting views on 'consequential losses' and how they are defined. In particular, it showed that the differences between risks included in insurance policies can infer a lack of clarity about the meaning or understanding of the term 'consequential loss'. The problem has both legal and commercial/managerial components. Fundamentally, the term 'consequential loss', whilst quite commonly used in the industry, appears not to be amenable to precise legal definition. This leads to practical implications that if the risk cannot be defined, problems will inevitably occur when attempts are made to allocate it.

In this Chapter, the author discusses the extent of the problem of definition of 'consequential loss' and the practical problems which flow from this. The author starts the Chapter by outlining the considerations of 'consequential losses' from the legal perspective and from the perspective of the commercial insurance market and the differences between them. The author then outlines the extent of the different definitions and the difficulties faced by the construction industry practitioners as a result. Based on the research which was done, the author presents Models which have been in use in standard forms of contract for limiting the contractor's liability for 'consequential losses' along with Models which have been developed during the course of this research which may be more feasible than the Models which have been in use. Finally, after comparison of the Models, the author presents recommendations about the most feasible Model to be adopted in forms of contract for construction industry practice.

6.2 HYPOTHESIS

The hypothesis which has been used for this area of research is;

Discrepancy between the legal definition and commercial definition of 'consequential loss' causes ambiguity for the construction industry and its parties and in turn this causes it to be excluded from insurance requirements in most standard forms of contract.

6.3 LITERATURE REVIEW

6.3.1 INTRODUCTION

In this Section, the author provides an insight into how the term 'consequential loss' is viewed from a legal perspective and from a commercial perspective.

Several writers have considered 'consequential losses' but all within the context of its insurance. However, the author believes that their comments provide a valuable insight into the nature of 'consequential loss' and help to clarify its applicability within the context of the construction industry.

The author starts this Section by providing a consideration of 'consequential losses' in the English legal system.

6.3.2 DEFINITION OF 'CONSEQUENTIAL LOSS' IN A LEGAL CONTEXT

The author has been unable to find a precise legal definition for the term 'consequential loss'. However, in a legal context, there is reference to what may be ordinarily referred to by industrialists and practitioners as 'consequential loss'. Keating (69) attempts to define some boundaries to this type of loss. He states;

“ ‘Consequential loss’ is *likely* to approximate to loss within the second limb of Hadley v. Baxendale. It is loss which is in some way less direct or more remote than that loss or damage which remains recoverable despite the exclusion clause. “Consequential” does not cover loss which directly and naturally results in the ordinary course of events. Where sellers were in breach of contract in supplying masonry blocks, there was a clause in their contract seeking to exclude their liability for consequential loss or damage caused by or resulting from late supply. This clause was held not to exclude claims against the buyers by their sub-contractors for delay in the subcontractors’ work caused by the absence of the materials which the sellers ought to have delivered.”

Hudson (54) shows that under the “two branches” of the Hadley v. Baxendale rule laid down in that case, the injured party is entitled to be indemnified against any loss likely to arise in the usual course of things from the breach (the first branch); and also such other loss outside the usual course of things as is in the contemplation of the parties at the time of the contract as the likely result of the breach of it (the second branch). Hudson, however, does not provide an explanation of the second branch of the rule even though he states that in general, under the first branch of the rule in Hadley v. Baxendale, normal or reasonable profits may be recovered for delay in completion of what are obviously profit-earning building or engineering projects, or a reasonable figure for inconvenience and loss of business. In order to recover special or abnormal profits, the owner will have to satisfy the requirements of the second branch of the rule.

On exclusion clauses, Hudson (54) states that until comparatively recently, “consequential” damage provisions were usually to be found in exclusion clauses, often in mechanical or manufacturing or supply contracts, and primarily concerned to prevent the liability of the manufacturer or supplier going beyond replacement of parts or the repair of defects, or to restrict liability for delay in delivery.

To illustrate the difference between ‘direct’ losses which may fall under the first branch of the rule and ‘consequential’ losses which may fall under the second branch, Hudson provides two cases where it has been decided that the losses were ‘direct’ rather than ‘consequential’ and therefore falling under the first branch of the rule, even though they may have been easily construed as ‘consequential’ losses by construction risks insurers

and construction industry practitioners (see Section 6.3.3 and Section 6.4). The second case provides the details of the example used by Keating (69) in his definition of ‘consequential losses’ above;

“(1) A contract for the manufacture and supply of main engines for a ship provided that liability for defects and materials discovered during construction should be limited to replacement of defective parts and remedying defects at the manufacturers’ works “but their liability does not extend to any loss or damage direct or indirect caused by the failure of such defective part or by the detention of the ship, but only to the cost of the actual remedy or replacement of the parts... *nor shall their liability ever.... extend to any indirect or consequential damages or claims whatsoever*”. The engines were in fact never satisfactory and the owners had others built elsewhere (for the extra cost of which liability was admitted). The owners claimed loss of profit while deprived of the use of the vessel, and various other expenses. *Held*, by Atkinson J., that the damage claimed was direct and immediate and “not indirect and consequential” and so was recoverable: *Saint Line v. Richardson, Westgarth* [1940].

(2) A contract for the supply of masonry blocks to a main contractor provided that: “our liability shall be limited to free replacement of goods shown to be unsatisfactory. We are not under any circumstances to be liable for any *consequential loss or damage* arising by reason of late supply or any ... defect in any materials or goods supplied.....”. As a result of delays in delivery, the contractors claimed loss of productivity, delay costs, and an indemnity against another sub-contractor’s delay claims. *Held*, by the Court of Appeal, affirming Parker J., and without calling on the main contractor, that the damages claimed resulted directly and naturally from the breach and were not “consequential”, and so were recoverable: *Croudace Construction Ltd. v. Cawoods Concrete Products Ltd.* (1978).”

Hudson also states;

“ these strict interpretations in the case of exclusion clauses have been paralleled by a correspondingly generous interpretation of “direct loss or expense” wording when used positively in compensation provisions. Interest in the form of financing charges has been held to be recoverable by contractors under the wording of Clauses 11(6) and 24 of the 1963 RIBA/JCT forms. Wording of this kind will include any damage recoverable under the first branch of the Hadley v. Baxendale rule, which it has been seen will include a wide range of heads of damage which might otherwise in a loose sense be described as ‘consequential’ or ‘indirect’.”

These cases reveal the scope of the legal definition of 'consequential losses' as being too wide and encompassing. The author will show in the following Section that there is a discrepancy in definition between these legal definitions and the commercial insurance market definitions.

6.3.3 DEFINITION OF 'CONSEQUENTIAL LOSS' WITHIN INSURANCE CONTEXT

Writers use the term 'consequential loss' loosely to mean loss of production. For example, Doherty (72), in accounting for loss of production due to fire in the United Kingdom, stated;

"In 1973 direct fire losses in the United Kingdom accounted for a little over 0.3 percent of the Gross National Product. This figure relates to the estimated material damage by fire and, if other costs attributable to fire or its prevention such as the costs of protection, fire brigades, administering insurance, loss of life etc. are added, then the cost of fire reaches about 1.1 percent of GNP. Further addition should be made for indirect losses such as lost production. Estimates vary widely as to how significant this *consequential loss* may be. Intuitive estimates given by risk managers range from ratios of 2:1 (*consequential loss* to direct loss) to 4:1. If these losses were simply added together a certain amount of double counting would occur since some of the lost production of one firm due to a fire would be taken up by rival firms with spare capacity. The ratio of 1.5:1 probably gives a conservative estimate of *consequential loss* due to fire."

The lost production which has been labelled as 'consequential loss' by Doherty (72) may have included reasonable and normal profits which legally may be construed as direct losses. However, Doherty has not stated what the loss of production included nor how the estimates have been reached.

Another example of authors who refer to this category of financial losses as 'consequential' are Dinsdale et al (23) who state;

"that many businessmen are still content with an ordinary material damage fire policy on the buildings and contents of their premises because they do not realise the heavy uninsured loss they would sustain in the event of fire by reason of the interruption or complete stoppage of business. While the fire policy will,

in time, and if adequate, provide the money necessary to reinstate the material damage, the Insured is faced with two serious financial problems until his premises are completely rebuilt and re-equipped and his trading activities return to normal. These problems are:

- (1) The temporary loss, partial or complete, of normal revenue; and
- (2) The necessity of maintaining various payments, e.g., rates, mortgage interest, salaries or wages to certain of his employees, while revenue has ceased or diminished.

In addition, he may incur heavy extra expenditure in an attempt to carry on the business by renting other premises, having work done elsewhere, and adopting other similar expedients. These financial problems can be overcome by means of a loss of profits policy which covers:

- (1) Loss of net profit (from revenue).
- (2) Continuing (or standing) charges which do not vary with the turnover.
- (3) Extra expenditure incurred to reduce the loss of revenue to a minimum.

If a businessman has a properly-drafted profits policy, with an adequate indemnity period (the period during which the shortage in turnover is dealt with under the terms of the policy), he should be indemnified for his loss of trading during reinstatement following fire, in addition to indemnification under his material damage fire insurance for the loss of, or damage to, the buildings and contents.

Various special perils, mainly similar to those detailed above, can be insured, and there is also an extension peculiar to profits insurance, covering loss of profits following upon suicide at an hotel or boarding house causing the guests to seek accommodation elsewhere; or loss of trade at such establishments because of the outbreak of an infectious disease. *Consequential loss*, or 'time loss', cover is also available in respect of financial loss resulting from breakdown of plant."

Riley (78) provides an explanation of the different terms which have been used to define 'consequential losses' in the U.K., the U.S.A. and, in Canada. He states;

"the term 'consequential loss insurance' has over the years superseded the use in the U.K. of the original nomenclature of 'loss of profits insurance'. The latter tended to direct thought too exclusively towards net profit and although protection of this may be the fundamental purpose of such policies, they are also concerned with other matters such as directors' remuneration, salaries and wages, standing charges and additional expenditure which are generally of much greater amount and are of vital importance in arriving at net profit. There are also many additional items and extensions of cover available today which

in earlier years were not insurable. These are more easily envisaged in the context of ‘consequential loss’ than under ‘loss of profits’. Unfortunately, there is no universal agreement amongst insurers on a title for this form of insurance. In the U.S. it was formerly called ‘Use and Occupancy’ (U. & O.) but this has now been outdated by ‘Business Interruption Insurance’ (B.I.I.). There and in Canada the term ‘consequential loss’ is used for what in the U.K. is known as ‘Spoilage Insurance’ whilst in Canada a ‘Profits Insurance’ is the name for a cover almost the same as a U.K. ‘consequential loss gross profit’ policy. Meanwhile the term ‘business interruption insurance’ has over recent years come into more general use in the U.K. through its adoption by a number of insurance companies and brokers. In other countries throughout the world, there is no standard term but ‘consequential loss insurance’ is the one most used and the leading authority in Great Britain for this form of insurance is the Consequential Loss Committee.”

Riley (73) outlines the different classes of losses with different nomenclatures used by the commercial insurance markets in the mentioned countries. The author believes that the classes can be presented in tabular form as shown below in Table 4 where Class A1 of losses may be regarded as a subset of Class A of losses;

	UK	US	Canada
Class A of losses	Consequential loss (Loss of profits insurance)	Business interruption (Use and Occupancy)	-
Class A1 of losses	Consequential loss gross profit policy	-	Profits Insurance
Class B of losses	Spoilage Insurance	Consequential loss	Consequential loss

Table 4 : Classes of Consequential Losses

From Riley’s description, Class B appears to be different but the author has been unable to ascertain what is meant by Spoilage Insurance. Consequently, it is not known whether Class B is a subset of A or A1 or vice versa.

Even if the UK legal definition and the UK construction industry practitioners understanding of the term ‘consequential loss’ were ignored, it can be seen that the usage of the term ‘consequential loss’ for different classes of losses within commercial insurance markets may in itself be a source of confusion.

Riley does not provide information about the detail of the cover provided by 'consequential loss insurance' in the UK. However, a report published by the Insurance Institute of London (74) shows that 'consequential loss' policies are available to provide cover for the insured who is usually the employer, who may be a manufacturer or a property developer against:

(1) Advance or delayed profits.

This provides cover for the anticipated income, namely gross profit in the case of a manufacturer or rent in the case of a developer, not actually being earned at the time of damage.

(2) Additional or prolonged interest charges and loss of use of capital.

In the event of damage to a speculative project which is to be sold on completion, there would be a delay in receipt of the proceeds from the sale. Cover for this can be arranged at an agreed rate of interest on the amount of the net proceeds of the sale for the time that it is delayed, subject to a maximum indemnity period. Alternatively, the interest on a bridging loan could be insured as could prolonged interest charges on an existing loan, either at the same agreed rate of interest or at a higher rate where necessary for the period that such loan is prolonged.

(3) Increased costs of unbuilt portions of the works.

Delay caused by damage may, in times of inflation, increase the cost of completing work unfinished at the date of damage. A new form of policy has been developed to insure against the increased cost arising. The extent of the loss will depend on the time taken to resume completion of the unfinished works, the value unfinished and the rate of inflation in the construction industry.

(4) Additional cost of working.

Extra expenses may be incurred by the contractor to expedite the work following damage. Consequential loss insurers consider these expenses to be difficult to identify, particularly when time has already been lost on the contract prior to the damage.

(5) Fines and penalties.

There is an increasing practice for architects to impose upon contractors the responsibility of obtaining insurance to provide a fixed sum following damage by certain specified perils. Only

rarely does an insurer consider providing this type of policy which does not constitute an indemnity. It is generally desirable for insurance to be sought in the name of the employer on a more conventional basis.

Writers seem to be suggesting that the principle upon which 'consequential loss insurance' is based is simple. 'consequential losses'. For example, Riley (73) states;

“The basis of 'consequential loss insurance' is the simple principle that reduction in turnover after a fire is a reliable guide to and a suitable index for measuring the proportionate effect of the fire upon the earnings of a business. The actual loss can be ascertained by applying to this reduction the ratio which standing charges and net profit together normally bear to turnover. This is the basis of most of the 'consequential loss insurance' transacted in the United Kingdom. A U.K. 'consequential loss' policy undertakes to provide an indemnity for the loss during a period of interruption after fire.”

The period of interruption after fire, for example, may be easy to quantify, however, if the period of interruption produces further delays, for example, on subsequent projects, then those may not be easy to quantify. The period of indemnity, therefore, becomes another issue. Interview data (see interview 9, p.9/10) shows that the insurance market would limit their period of indemnity within the policy. For a claim made by a third party, if it is possible to demonstrate that the 'consequential loss' is on-going, then losses may be recovered, if there was negligence in causing the damage. However, it would be difficult to prove that it would be on-going forever but even if that was possible, in practice, the insurance market would try to negotiate a settlement. In the extreme cases where a settlement cannot be reached, long term financial effects may be worked out via 'forensic accountants'.

Within the context of construction projects, various types of losses discussed so far would have been losses to the employer. Financial loss to main contractors consequent upon delay of completion through their risks or through low performance will be in the form of liquidated damages. It is worth noting that interview data (see interview 11. p.11/2) showed that contractors' liquidated damages may also be regarded as 'consequential loss' by the commercial insurance market. It is also possible for the contractor to insure this type of 'consequential loss'.

Along the same lines, further interview data (see interview 9, p.9/11) shows that liquidated damages which may be incurred by main contractors on offshore oil and gas industry contracts are also regarded as ‘consequential losses’. If there are losses beyond the liquidated damages specified in the contract, then the employer bears the additional losses. However, both the liquidated damages which may be suffered by the contractor and the losses beyond the limitation for liquidated damages which may be suffered by the employer are regarded as consequential losses. An oil and gas industry client (see interview 13, p.13/8) referred to the same type of losses as ‘consequential losses’ by stating;

“ ‘Consequential loss’ is something which is one step removed from the specific project that is being dealt with. If, for example, the project is not delivered on time, and if, as a result, BP were unable to meet a contractual liability they had entered into, that would be a ‘consequential loss’ in respect of the contracts that BP have with the contractors to deliver the project. For the most part, we would not expect contractors to bear ‘consequential losses’. That is usually the issue, that contractors are very worried that we will try and sue them for ‘consequential losses’.”

Compiling the literature review and interview data, the types of losses which are regarded by the commercial insurance market as ‘consequential’ may therefore be summarised in Table 5 below;

Losses to the employer	Losses to the contractor
Delay due to risk carried by the employer which may result in; <ol style="list-style-type: none"> a. reasonable and normal profits loss b. additional or prolonged interest charges and loss of use of capital c. fines and penalties 	<ul style="list-style-type: none"> • Liquidated damages (delay damages and low performance damages). • Increased costs of unbuilt portions of the works. • Additional cost of working

Table 5: Insurance Market Definitions of Consequential Losses

6.4 DEFINITION OF 'CONSEQUENTIAL LOSS' IN PRACTICE

The research findings from the literature review show that there is a difference between the definitions of 'consequential loss' in the English legal context and the commercial insurance market context. For example, reasonable and normal profits are not regarded as 'consequential loss' in the law whereas they are in the insurance market. The author, therefore, had to identify in what way is the term viewed and defined by the parties to construction contracts, namely, contractors and clients. The findings of this part of the research are outlined in this Section.

One of the points that the research has revealed is that there seems to be significant differences of understanding between practitioners about the term. Research has revealed that not all practitioners necessarily regard 'consequential loss' as loss of production and profits. For example, one main contractor (see interview 7, p.7/6) defined the term as follows;

“ If we are delivering concrete for a multi-storey block and by the time we come to the cube test, the column that this concrete went into falls down. If the ready-mix company says that I will reimburse you for this column but not for the four floors that will come down or any of the consequences that this column fell down, this would be regarded as 'consequential loss'.”

Another different main contractor defined it as follows (see interview 14, p.14/5);

“ If there is an initial delay, for example, due to an unforeseen ground circumstance, that delay will immediately create 'consequential loss'. A 'direct loss' will be incurred, additional expense, overcoming the unforeseen ground condition. If the delay is not mitigated, it will create a delay to subsequent activities whether they are drainage, bridges etc.. In my opinion, that is the 'consequential loss' of the initial problem.”

Both seem to include an element of loss of production or loss of profit for the contractor, however, their definitions are not necessarily linked to a loss of production or a loss of profit that may be suffered by the employer.

Legally, these types of losses may have been regarded as 'direct'. The insurance market would not have regarded them as 'consequential' unless they produced an overall delay to the project whether this delay is suffered by the contractor or the employer. However, interview data also shows that even when practitioners refer to the term as loss of production and profits, there is no common understanding as to what that includes. For example, one interviewee (see interview 8, p.8/9) stated;

“ It depends on the particular project that you have been with but as a general statement I *suppose* it would be costs which are incurred as a result of the failure to complete the project. The direct costs would be the costs of putting that project in place. 'Consequential losses' would be other losses that are incurred by virtue of that facility not being put in place for example, loss of revenue or loss of profit. However, there would be a dispute regarding what you are liable for. Consequential losses do not have a common understanding by everyone in the industry. Someone may try to include in his 'consequential losses' losses that have no real connection to the particular project. They might say that the failure to complete a given project had a 'knock on' effect to their private development plan of a given series of projects.”

The lack of common understanding of the term 'consequential loss' is ascertained by further interview data (interview 9, p.9/10) where the interviewee stated;

“ Consequential loss does mean different things to different people but my definition of it is the financial effects of any risks occurring. If a fire occurred on a site, the consequential loss resulting from that fire is the cost of repairing the damage with further impact of delays to the job to repair the damages. Similarly with a PI problem, the consequential loss here is the cost of putting right the design fault. And again, any on-going impact that an employer might suffer because he cannot get his building into use. There are other people who regard it purely as the damage flowing from an incident and we certainly have to clarify with our subsidiaries, whenever they talk about consequential loss, what it is they are meaning. It is a very confusing phrase and I wish people would stop using it. Sometimes, we might tell one of our subsidiaries that something is not insurable when in fact it is, and vice versa. So we have to be very particular about that phrase. Parts of it are insurable and parts of it are not.”

In a different interview (see interview 10, p.10/7), the interviewee stated;

“ My understanding of the term is that it is whatever a clever lawyer would make it to be. He could argue that it is some delay we have caused to the works. And that is likely to be a large number because of the nature of the work we are doing.”

Practitioners, therefore, seem to have a different understanding of the term 'consequential loss'. At the same time, we find that writers like Roder (76) are assuming that practitioners at large are familiar with the term and that its meaning is known. For example, Roder stated;

"Another exclusion common to all contracts is the exclusion of consequential loss, i.e. loss of use, increased cost of working and so on. It is always excluded under the property section of a Contractors' All Risks policy. Certainly the consequential loss can be covered under a separate policy taken out by the employer and the risks covered under this separate policy could be advanced for delayed profits, additional interest charges, additional cost of working etc..."

Collins dictionary (7) defines the term 'consequential' as;

"happening as a direct result of a particular event or situation."

It follows that 'consequential loss' may be a loss which is happening as a 'direct' result of a particular event or situation. It is not surprising, therefore, that there is such discrepancy between practitioners in the construction industry as the dictionary definition of the term is too encompassing. The key point to make here is that the word direct could mean anything. It should be noted that the author has been unable to find any literature on the difficulty of precisely defining the type of losses that may fall within concept of 'consequential'.

Apart from the discrepancies mentioned above, other discrepancies are also apparent from within the insurance market. The report published by the Insurance Institute of London (74) states, for example, that extra expenses may be incurred by the contractor to expedite the work following damage and that 'consequential loss' insurers consider these expenses to be difficult to identify. Nevertheless, we find that a standard contractor's insurance policy C.A.R. policy (75) states the following;

“ The Company will indemnify the Insured for architects’ surveyors’ consulting engineers and other professional fees necessarily incurred in the repair reinstatement or replacement of Damage to the Property Insured.....”

This could be construed either as a contradiction of the Institute’s statement or as a device to limit the expenses to professional fees on the assumption that they can be easily identified, whereas other expenses cannot. However, another standard C.A.R. policy does not cover the contractor for consequential loss of any nature. This is specifically included as an exception clause 6(b) which reads;

“The Company shall not indemnify the Insured against consequential loss of any nature.”

In summary, the author has not been able to find in the literature a consideration of the fundamental meaning of the term “consequential loss” nor any explicit discussion of the difficulty of defining it. Writers seem to assume that the meaning of the term is known. However, research has revealed that there are discrepancies in the description of the term between the legal profession, the commercial insurance market and practitioners within the construction industry. Practitioners, therefore, try to approach understanding from their specific business, project or location in the project team and contractors are more likely to view ‘consequential losses’ in terms of the effects on the specific contract.

6.5 CONSEQUENTIAL LOSS IN FORMS OF CONTRACT

The problem is further amplified by some forms of contract clauses. Within their clauses, the term ‘consequential loss’ is mentioned but is not defined. Clause 44.2 of MF/1 (50) states;

“Except as expressly provided in Sub-Clauses 34.1 (Delay in Completion) and 35.8 (Consequences of Failure to Pass Performance Test) for the payment or deduction of liquidated damages for delay or failure to achieve performance and except for those provisions of these Conditions whereby under Sub-Clause 41.2 (Allowance for Profit on Claims) the Contractor is expressly stated to be entitled to receive profit, neither the Contractor nor the Purchaser shall be liable to the other by way of indemnity or by reason of any breach of the Contract or of statutory duty or by reason of tort (including but not limited to

negligence) for any loss of profit, loss of use, loss of production, loss of contracts or for any financial or economic loss or for any indirect or consequential damage whatsoever that may be suffered by the other.”

Form MF/1 also has its Clause 47.7 stating;

“The Insurance Policies may exclude cover for indirect or consequential loss or damage including any deductions from the Contract Price for delay.”

FIDIC (Elec and Mech) 3rd (65) has Clause 42.1 stating;

“Neither party shall be liable to the other for any loss of profit, loss of use, loss of production, loss of contracts or for any other indirect or consequential damage that may be suffered by the other”

The difficulty with these Clauses is that ‘indirect or consequential damages’ are an addition to loss of profit, loss of production, loss of contracts etc.. However, whilst the term is included, there is no definition that associates it.

A more feasible model seems to be the one adopted by the IChemE Forms of Contract (52,53) where losses are outlined but without including the term ‘indirect or consequential losses’. The IChemE Red and Green Books have Clause 44.1 stating;

“The Contractor shall not be liable to the Purchaser by way of indemnity or by reason of any breach of the Contract for

- a) any loss of production or profit or of any contract that may be suffered by the Purchaser, or
- b) any loss of operating materials or catalysts, or
- c) any loss or damage arising from any design or information which the Purchaser has specifically instructed the Contractor to use,

except to the extent, if any, that recoveries in respect thereof are obtained under insurance effected pursuant to Clause 32.”

Other forms of contract, for example, ICE Conditions of Contract, FIDIC 4th and ECC do not limit the contractor’s liability for any losses such as loss of production or loss of profit. These forms do not include the term ‘consequential loss’ either.

6.6 OPTION MODELS

All the problems mentioned in the previous Sections lead to the development of the Option Models shown in the ‘Consequential Loss Flow Chart’ shown below. It starts with the fundamental question, do forms of contract include ‘consequential losses’?

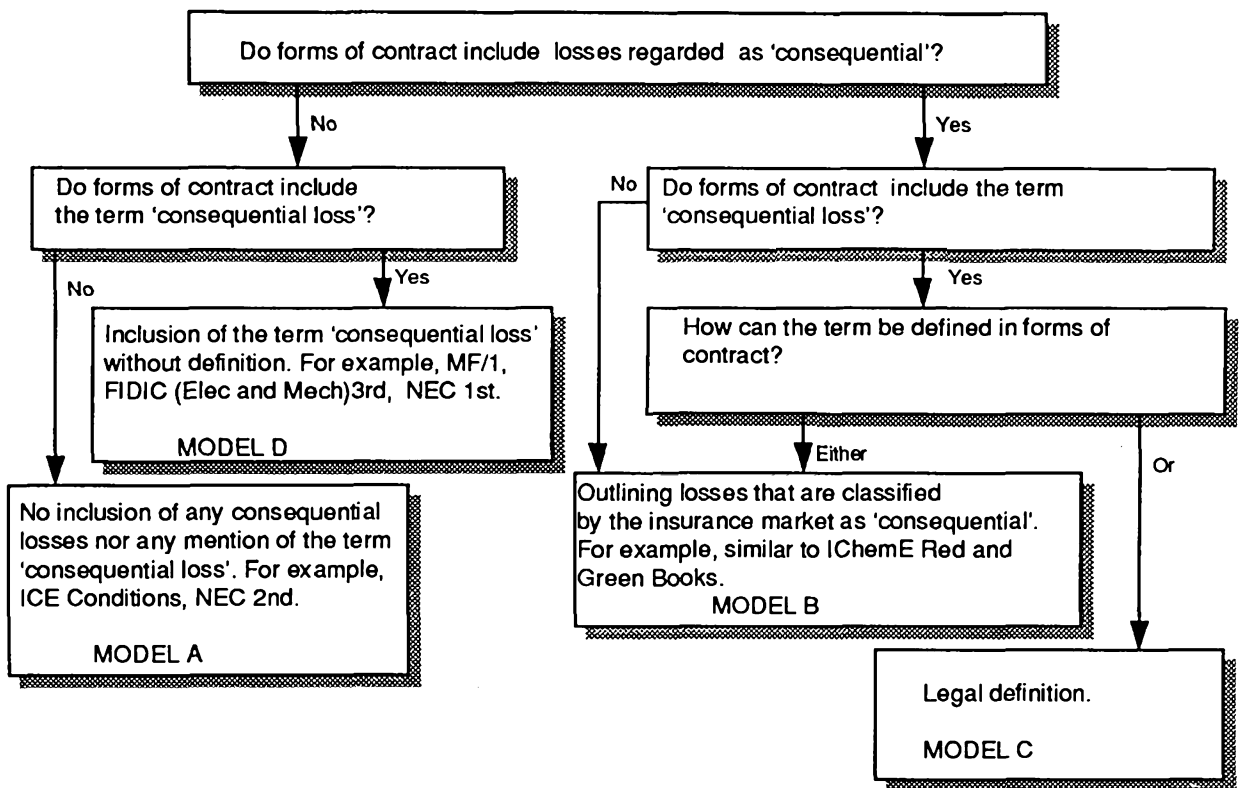


Figure 10 : Consequential Loss Flow chart

- Model A: There are some forms of contract, for example, ICE Conditions of Contract, JCT Building Contracts, and NEC 2nd Edition, where neither the term ‘consequential loss’ is mentioned nor losses that are classified by the insurance market as

'consequential' are. 'Consequential losses' (as outlined by the insurance market), therefore, neither become an inclusion nor an exclusion in the insurance requirements from contractors. The advantage of this Model is that there would not be any legalistic arguments about the meaning of the term 'consequential loss'. However, should any 'consequential losses' arise out of damage caused to the works, it would not be known whether these have been included or excluded from the insurance policies taken out by the contractor and it would not be known whether the contractor is liable or not.

- Model B: Within forms of contract, it may be possible to outline the type of losses that are to be excluded from the insurance policies required to be effected by the contractor. These losses may be the same as the ones classified by the insurance market as 'consequential'. The advantage of this Model is that there would not be any ambiguity about the losses which the contractor will not be held liable for and which are excluded from insurance policies. Also, the employer and the contractor may draw out separate insurance policies for them if desired.
- Model C: Within forms of contract, it may be possible to outline the legal definition for 'consequential loss' as the type of loss to be excluded from the insurance policies required to be effected by the contractor. However, the disadvantage of this Model is that legal definitions will need to be made more precise.
- Model D: Within some forms of contract, the term 'consequential loss' is included within the forms to exclude certain types of losses from insurance policies. However, no attempt is made to define the term. The disadvantage of this Model is that it creates ambiguity about the term and it would be left to different interpretations.

Within the forms of contract shown on the Flow chart, apparently Models A, B and D are adopted. The author has been unable to find any standard form of contract that adopts Model C.

6.7 SUMMARY AND CONCLUSIONS

6.7.1 SUMMARY

The research findings may be summarised as follows;

- The legal definition for ‘consequential loss’ is too wide in scope.
- There are discrepancies in the description of the term between the legal profession and the commercial insurance market, for example, reasonable and normal profits loss are not regarded as ‘consequential losses’ by the law.
- The lack of common understanding about the term ‘consequential loss’ may increase the number of cases which have to be litigated.
- Writers seem to be assuming that the term ‘consequential loss’ is clear in meaning.
- The commercial construction insurance market in the UK is specifying certain types of losses as ‘consequential losses’.
- Construction industry practitioners have different interpretations about the meaning of the term ‘consequential loss’ and at times, these may be different from the legal definition and the insurance market definition.

6.7.2 CONCLUSIONS

For this area of research, the author adopted the hypothesis outlined in Section 6.2. The research has revealed discrepancies in the description of the term ‘consequential loss’ between the legal profession and the commercial insurance market definition and that there is certainly ambiguity for the construction industry and its practitioners. The research, however, did not show that the discrepancies cause it to be excluded from the insurance requirements in standard forms of contract. There may be other reasons for the exclusion. However, the author is of the opinion that the exclusion remains a minor issue as either the employer or the contractor can draw out separate insurance policies for these types of losses. However, more important is the clarification of the types of losses which are to be excluded from the insurance requirements in forms of contract.

Within Section 6.6, the author outlined four different Models for dealing with 'consequential loss' in standard forms of contract. As the contractor may be held liable for losses of profit and losses of production suffered by the employer, Models A and D may be an extension of the contractor's liability. The contractor's liability may, therefore, be limited through Models B and C. However, Model C needs further clarification as the legal definition for 'consequential loss' may be too wide in scope. The author, therefore, recommends that Model B, where specific losses are outlined in forms of contract as 'consequential losses', may be the most robust Model to be used. The author further recommends that the losses specified should be the same as those identified by the commercial insurance market as 'consequential losses'.

6.7.3 RECOMMENDATIONS FOR FURTHER WORK

The author has mentioned in the conclusions that the types of losses outlined by the insurance market as 'consequential' may still be wide in scope and that they may need further refinement. This is an area which needs further work. For example, the author has shown that the types of losses which are considered by the insurance market to be 'consequential' are any derivatives of loss of production. However, the research has not revealed whether there are maximum periods of indemnity for these losses.

In the legal area, it appears that the interpretations of direct loss include 'losses' which are regarded as 'consequential' in most commercial areas. However, there appears to be no legal attempt to draw a boundary nor to consider the extreme limits of either direct or 'consequential loss'. The legal cases considered could lead managers to the view that 'consequential losses' are unlimited in both scope and time. Legal clarification of this would be helpful.

CHAPTER SEVEN:

SUBCONTRACTED WORKS INSURANCE

7.1 INTRODUCTION

Within the construction industry in the UK, the different forms of contract drafted for different engineering and construction disciplines require the main contractors and their subcontractors to acquire certain insurances. These forms of contract, however, do not necessarily have the same insurance requirements. In almost all forms of contract, main contractors and their subcontractors are required to insure their employees (compulsory by law), third party liabilities, equipment and material on and off site. Even though all forms require the main contractor to insure against loss or damage to the whole of the works, they may not, however, require subcontractors to insure their parts of the works. Thus, there appeared to be two different models for subcontractor insurance of the works in practical use;

- a) The main contractor fully insures the works and the subcontractors are also required to insure their parts of the works.

- b) The main contractor fully insures the works but subcontractors are not required to take out their own individual insurances for the works.

The initial research conducted by the author was into the database of comments made during the drafting of the NEC. This showed that, for the two different models that are adopted for insuring the subcontracted works, different bodies in the construction industry hold contradicting opinions on which model is preferable. These opinions appeared to be based on their reasoning as to which overall strategy is more commercially suitable.

The main objective of the subsequent research was to analyse the advantages and disadvantages of each model. The author attempted to identify the model which may provide optimum use of funds for the parties concerned and the one which may provide optimal usage of the time spent on administration, in relation to the adequacy of cover. Also, the research aimed to test the supposition that these are the only two Models available for dealing with insurance of subcontracted works. It was hoped that a practical benefit of the research would be that the industry can be better informed when making the choice.

In this Chapter, the author outlines the hypothesis adopted while conducting research in this area, then he provides the literature on the subject area followed by an analysis of the implications of each Model and finally, the author presents his conclusions.

7.2 HYPOTHESIS

The hypothesis adopted by the author for this research area is as follows;

Different Models are adopted for insuring the subcontracted works within different disciplines. It may be possible to adopt one Model for insuring subcontracted works for all engineering and construction disciplines.

7.3 LITERATURE REVIEW

7.3.1 FORMS OF CONTRACT AND ASSOCIATED SUBCONTRACT FORMS

Within Chapter Two, the author outlined the general insurance requirements from main contractors and the losses that could be suffered by them. As mentioned before by Keeling (29), the main contractor would need to insure the permanent works, temporary works, his plant and equipment, injury, loss or damage to third party or property and his employees and any labour only subcontractors. Keeling also stated that the subcontractors can suffer losses in any of the following ways;

- to their parts of the works.
- to their plant and equipment.
- injury, loss or damage to third party.
- injury or death of employees.

The subcontractor, therefore, can draw out insurance policies for any of the above. Table 6 below summarises the different insurances taken out by main contractors and their subcontractors and the type of policy that they may draw out these insurances on;

To be covered by insurance	Policy
Main Contractors Works (Permanent, Temporary)	C.A.R.
Subcontracted Works (Permanent, Temporary)	Either C.A.R. only or C.A.R. and subcontractor's C.A.R.
Main Contractor's plant, material, equipment (on site, off site)	C.A.R.
Subcontractor's plant, material, equipment (on site, off site)	Subcontractor's C.A.R.
Main Contractor's employees	Main contractor's employer's liability policy
Labour Only Subcontractors	
Subcontractor's employees	Subcontractor's employer's liability policy
Third Party liability including property (Main Contractor)	Main contractor's third party liability policy
Third Party liability including property (Subcontractor)	Subcontractor's third party liability policy

Table 6 : Types of Insurance Provisions and the Policies Available

In all the standard forms of contract used for different disciplines in the UK, there are clauses that state what the main contractor needs to insure (insurances required above), but there are different approaches adopted for the insurances required from their subcontractors which are stated in the subcontract forms. Before outlining the insurance

requirements in subcontract forms, the author outlines in Table 7 below the different forms of contract used for different disciplines in construction in the UK along with their associated subcontract forms.

Discipline	Form of Contract	Associated Subcontract Form
Civil Engineering	NEC	NEC Subcontract Form
	ICE	FCEC Blue Subcontract Form
Civil (International)	FIDIC	
Government Contracts	GC/Works/1	FCEC Blue Subcontract Form (Civil Engineering Works only) GW/S (Building only (post 1985))
	GC/Works/2	
Building	JCT63 and MW63	NFBTE/FASS Green and Blue Forms
	JCT80 and MW80	NSC/4, NSC/4a and DOM/1
	JCT86	NSC/C
Mechanical and Electrical Works	MF/1 (replaced Model Form A & Model Form B3)	MF/1 Subcontract Form
Process plant contracts	IChemE (Red and Green Books)	IChemE Yellow Book

Table 7 : Forms of Contract and Associated Forms of Subcontract

The FCEC Blue Form of Subcontract (77) is the subcontract form drafted to be used with the ICE Conditions of Contract as well as the FIDIC Standard Forms and the General Conditions of Government Contracts (GC/Works/1 and GC/Works/2²⁷). However, it should be noted that for government building contracts, the FCEC Blue Form of Subcontract was in use only prior to 1985. After that the GW/S Subcontract Form was drafted to be used on such contracts.

²⁷ General Conditions of Government Contracts for Building and Civil Engineering Minor Works.

For building, there were different subcontract forms drafted to be used in conjunction with the JCT Building Forms. The latest subcontract form is the NSC/C (78) which according to Emden (79), is used with the JCT86 Conditions of Contract (80). It superseded the former Subcontract Forms in 1991.

Eaglestone 1990 (75) showed that there were two different forms of contract for mechanical and electrical works. Model Form A has been in use in connection with 'Home Contracts-With Erection'. Model Form B3 has been in use in connection with 'Export Contracts-With Erection'. However, both have been replaced with Model Form MF/1 (50), the latest Model Form suitable to both home and export contracts. In conjunction with it is the MF/1 Subcontract Form.

For process plant contracts, the IChemE Yellow Book Subcontract Form (81) is associated with the IChemE Red and Green Books.

7.3.2 SUBCONTRACTED WORKS INSURANCE WITHIN DIFFERENT FORMS OF CONTRACT

7.3.2.1 INTRODUCTION

The author outlines in this Section the different approaches for insuring subcontracted works within different forms of contract. Section 7.3.2.2 shows the policy adopted within the NEC Subcontract Form (82) and the FCEC Blue Subcontract Form (77). Section 7.3.2.3 outlines the responsibility clauses and insurance requirements for main contractors in the building discipline.

7.3.2.2 NEC SUBCONTRACT FORM AND FCEC FORM OF SUBCONTRACT

All forms of contract mentioned place the whole responsibility of the works upon the main contractor. However, not all forms have a requirement for the contractor to insure the works. Eaglestone, 1990 (75) states,

“ until the proposed third edition of the GC/Works/1, there was no contractual obligation on the contractor to take out insurances either in respect of loss or damage to the works or any of the risks he or she is required to take.”

Vincent Powell-Smith (83) shows that Clause 8 within GC/Works/1-Edition 3 imposes an obligation on the contractor to maintain relevant insurance for the duration of the contract and for the longest specified maintenance period. There are alternative provisions as to the type of insurance to be maintained; which alternative applies will be specified in the abstract of particulars. Clause 8(3) Alternative A, deals with the standard ‘all risks’ insurance which most contractors now maintain. Clause 8(3) Alternative B covers ‘Combined Site Insurance’ which is taken out in the joint names of the Authority, the contractor and all sub-contractors.

For some forms of contract, insurance of subcontracted works seems to be optional for subcontractors. For example, Clause 84.1 of the NEC Subcontract Form (82) states;

“The Subcontractor provides insurances and those stated in the Subcontract Data unless it is stated in the Subcontract Data that the Employer or Contractor provides them.....”

The principles of the Clause have not changed with the NEC 2nd Edition Subcontract Form (ECC). Clause 84.1 of the ECC Subcontract Form ()states;

“The Subcontractor provides the insurances stated except any insurance which the Employer or the Contractor is to provide as stated in the Subcontract Data.....”

For both Editions of the NEC, the clauses show that the main contractor (or the employer) can provide insurance of the subcontracted works. So the main contractor has been given the option of choosing either of the models in practical use. The NEC drafters have been aware that there may be double insurance by the main contractor and subcontractors and therefore the NEC Guidance Notes (84) state the following regarding the insurance clauses of the Subcontract Form;

“Within the NEC, the main addition provides for an indemnity provided by the employer for the benefit of the contractor to be passed to the subcontractor. The employer’s risks remain, and the contractor passes those of his risks under the main contract to the subcontractor, where they apply to the subcontract works. Double insurance is largely avoided since the insurance premiums payable by the contractor under the main contract will reflect the proportion of the works which are subcontracted. The contractor, however, still carries responsibility for performance of the subcontractor. The subcontractor is always responsible for insuring his own Equipment and his employees.”

The policy is similar to the one adopted in the FCEC Blue Form of Sub-contract (77). Notes concerning the fifth schedule in the FCEC Blue Form of read as follows;

“Reference should be made to Clause 14 (Insurances) of the Subcontract. In completing the two parts of the Schedule the parties should take care to ensure that all insurances required by the Main Contract are effected by one or other of them and that there is no unnecessary duplication of insurance.”

This may imply a third Model where the main contractor only insures those parts of the works which are not subcontracted. Section 7.5.4 provides a discussion on this Model.

Clause 14 within the FCEC Blue Form concerns insurances and requires the subcontractor’s insurances to be specified in Part I and the main contractor’s insurance policy to be identified in Part II respectively of the Fifth Schedule. The FCEC Blue Form, however, does not specify the type of insurances to be taken out under Parts I and II of the Fifth Schedule. Eaglestone 1979 (85) comments on this by stating that;

“while the main contractor’s insurance under clause 14(2) is contemplated to be an insurance of the works against loss or damage, subclause 14(1) does not identify the kinds of insurance the subcontractor is to take out and these may be liability insurances as well as insurance of the works. The main contract specifically requires the contractor to insure against all save the excepted risks, thus it is likely that clause 14 contemplates that all loss or damage to the works (other than excepted risks) will be covered by the main contractor’s insurance under Part II. The Part I insurances will be other insurances peculiar to the subcontractor such as public liability and employers’ liability.”

Eaglestone 1979 (85) has also been among the first writers to suggest that subcontractors should insure their parts of the works for loss or damage even though he stated that they should only insure for risks not covered by the main contractor's policy. He stated;

“whatever the position about other insurances, the subcontractor's obligation to bring his own works to completion at his own risk, and then to maintain them until substantial completion of the main contract means that it would be imprudent not to insure these works against damage due to any risks not covered by the main contractor's policy endorsed with the subcontractor's name.”

Eaglestone 1990 (75) provides two examples of insuring under the FCEC Blue Form. They reflect the two Models which may be adopted for provision of projects insurances:

Example 1: Insurances

Part I: Subcontractor's insurances

Employer's liability - unlimited in amount.

Third party (public) liability - minimum on any one occurrence £1,000,000 (number of occurrences unlimited).

Plant and equipment - to the full value.

Subcontract works - to the full value.

The Subcontractor shall effect the above insurances in such a manner in the name of himself and such others as are required under the Main Contract that he assumes in respect of the Subcontract all the obligations and liabilities required of the Contractor under the Main Contract.

Part II: No benefit under the Contractor's policies of insurance is available to the Subcontractor.

Example 2: Insurances

Part I: Subcontractor's insurances

Employers' liability

Plant and equipment

Part II: Contractor's policy of insurance

The Subcontractor shall have the benefit of the Contractor's 'Contractor's All Risks' and 'Public Liability' insurance (subject to policy excesses).

Note: The public liability insurance will be included where it is part of the Contractor's all risks policy.

Example 2 suggests that the subcontractor may also benefit, not only from insurance of the works for loss or damage under the C.A.R. policy, but also from the public liability insurance under the C.A.R. policy.

7.3.2.3 JCT STANDARD FORMS OF SUBCONTRACT

The building forms of subcontract handle the issue of insuring subcontracted works in a different manner from the ECC Subcontract Form and FCEC Blue Form. Unlike the latter forms, insurance of subcontracted works may be governed by the insurance requirements in main forms of contract and therefore the author provides a consideration of those first. The similarity between the building main forms of contract and others arises from the fact that they all place a responsibility upon the contractor to insure the whole of the works (with the exception of GC/Works/1).

Under Clause 21 of the JCT80 (68), contractors are to ensure that their subcontractors provide public liability insurance and comply with the Employer's Liability (Compulsory Insurance) Act 1969. However, regarding insurance of the works (under Clause 22 of JCT80), Eaglestone 1985 (86) pointed out one major difference in main contract insurance requirements between ICE Conditions of Contract (46) and JCT80 (68);

“unlike the ICE Conditions of Contract, Clause 22 of JCT80 did not call for insurance cover for the contract works on an all risks basis. It required a fire and special perils type of cover.”

JCT80 does not outline the special perils for which the cover is to be drawn. It merely mentions Clause 22 perils. However, Eaglestone 1979 (85) states;

“under clause 5 of the former NFBTE/FASS Green Form (for nominated subcontractors), responsibility for subcontract work and also materials and goods properly on site for incorporation into the subcontract works is automatically assumed by the main contractor in the case of loss or damage by fire, explosion,

storm, tempest, flood, bursting or overflowing of water tanks, apparatus or pipes (whether such fire explosion, bursting or overflowing, or loss or damage from storm, tempest or flood is caused by the negligence of the subcontractor or those for whose actions the subcontractor is responsible or otherwise), lightning, earthquake, aircraft or anything dropped therefrom, aerial objects, riot and civil commotion. The main contractor does not automatically assume responsibility for loss or damage to such subcontract works or materials by other risks, e.g., subsidence, collapse, accidental damage, malicious damage, impact, dust or theft. He does so for materials and goods fully, finally and properly incorporated into the main works (before completion of the subcontract works) and upon completion and handover of the whole of the subcontract works. Both the exceptions just mentioned are subject to the loss or damage not being caused by the subcontractor, his servants or agents. Incidentally, clause 5 of the blue form (the subcontract form where the subcontractor is not nominated by the architect) is worded very similarly.”

The NFBTE/FASS Green Form is the subcontract form (for nominated subcontractors) used in conjunction with JCT63 (87). Clause 20 of JCT63 lists the same perils that Eaglestone does. The author, therefore, is assuming that the perils outlined above are the same as Clause 22 perils of JCT80.

Despite these contract insurance requirements, Eaglestone 1985 (86) also showed that main contractors may be drawing more extensive coverage than the requirements by virtue of their responsibility of the works for risks beyond fire and special perils;

“because the contractor by Clause 2 is required to complete the works, it is implied that he is also responsible for damage other than that caused by fire and special perils and thus the cover given by the C.A.R. policy is almost invariably used to protect the works.”

However, Turner (88) and Eaglestone, 1990 (75) have shown that under the JCT86 (78), the practice has changed so that the contractors are required to insure their works against all risks rather than fire and special perils. Fire and special perils type of risk would apply only to the subcontract works insured by main contractors.

The subcontract forms which associate JCT80 are NSC/4 and NSC/4a for nominated subcontractors, and DOM/1 for domestic subcontractors. The subcontract form which

associates JCT86 is NSC/C. The insurance requirements clauses in all those are the same. The different insurance requirements are outlined below as done by Turner (88);

“Subcontract clause 6: Injury to persons and property, indemnity to contractor.

Subcontract clause 7: Insurance, subcontractor.

Subcontract clause 7.2: Employer’s liability insurance

Subcontract clause 8: Loss and damage by the ‘clause 22 perils’ to subcontract works and materials and goods properly on site.

Subcontract clause 9: Policies of insurance.

Subcontract clause 10: Subcontractor’s responsibility for his own plant etc..”

Insurance of the subcontracted works is dealt with by subcontract Clause 8. As a result of the JCT80 Clause 22 provisions and JCT86, the subcontractor is relieved by Subcontract Clause 8 of insurance of his own works and materials to the extent that it is dealt with by one of the main contract parties, as the whole works and materials are embraced and not just those of the contractor himself. But the subcontractor, like the contractor, will probably ensure that he covers other aspects by his own insurance, such as work and materials off site, temporary items on site and risks not in the Clause 22 perils. Turner (88) ascertains this by stating;

“in respect of specified causes of damage to the whole of the works and materials (but not temporary items), either the contractor or the employer takes the risk entirely and may have to insure, so that the subcontractor is not responsible. Over other damage to the subcontract works and materials liabilities are delineated. Temporary items brought on site by the subcontractor are described in clause 10.1 as ‘belonging to or provided by’ the subcontractor and those related to him, while the list is extended to include ‘materials....not properly on site for incorporation’. They are at the subcontractor’s risk alone and he indemnifies the contractor with the exception occurring in the event of negligence on the part of the contractor or others under his control. Any insurance here is left to the subcontractor’s discretion by clause 9.2, although sensibly he would obtain it.”

As shown earlier, there has not been a change in insurance requirements between JCT63 (87) and JCT80 (68) and their respective subcontract forms. However, prior to the

publication of JCT80, Eaglestone 1979 (85) argued that subcontractors may need to draw out their own C.A.R. policy insuring risks beyond the fire and special perils;

“ unless the subcontractor’s interest in the subcontract works can be insured under the main contractor’s all risks policy (and not just the listed perils as required by subclause 5(d)(NFBTE/FASS Green and Blue Forms)), the subcontractor may well consider it advisable to take out his own contractor’s all risks policy (excluding the listed perils) on the subcontract works while his responsibility i.e., before they are fully, finally, and properly incorporated into the main works. Temporary materials, plant, tools, equipment belonging to or provided by the subcontractor are at the risk of the subcontractor by clause 19 (Green Form), except for loss or damage due to the negligence of the main contractor, his servants or agents. Any insurance against loss or damage to or caused by the aforesaid plant, tools, equipment or other property is the responsibility of the subcontractor. Clause 7 is the equivalent clause in the blue form to clause 19 of the green form. Consequently, clauses 19 and 7 provide further arguments for a subcontractor to consider taking out a C.A.R.”

The author, therefore, can summarise these findings on Tables 8 and 9 outlined below. Table 8 shows the requirements of the forms of contract whilst Table 9 shows the insurances that should be drawn out by contractors and subcontractors in a more pragmatic manner.

	JCT63	JCT80	JCT86
Main works	contractor for specified perils	contractor for specified perils	contractor on an all risk basis
Subcontractor works, permanent materials, equipment (on site)	contractor for specified perils	contractor for specified perils	contractor for specified perils
Subcontractor work (off-site)	-	-	-
Subcontractor permanent materials, equipment (off-site)	-	-	-
Subcontractor temporary materials, equipment (on site)	-	-	-
Subcontractor temporary materials, equipment (off-site)	-	-	-

Table 8 : Insurance Requirements in Building Forms of Contract

	JCT63	JCT80	JCT86
Main works	contractor on an all risk basis	contractor on an all risk basis	contractor on an all risk basis
Subcontractor works, permanent materials, equipment (on site)	contractor for specified perils	contractor for specified perils	contractor for specified perils
Subcontractor works, permanent materials, equipment (on site)	subcontractor for risks other than specified perils	subcontractor for risks other than specified perils	subcontractor for risks other than specified perils
Subcontractor work (off-site)	subcontractor on an all risk basis	subcontractor on an all risk basis	subcontractor on an all risk basis
Subcontractor permanent materials, equipment (off-site)	subcontractor on an all risk basis	subcontractor on an all risk basis	subcontractor on an all risk basis
Subcontractor temporary materials, equipment (on site)	subcontractor on an all risk basis	subcontractor on an all risk basis	subcontractor on an all risk basis
Subcontractor temporary materials, equipment (off-site)	subcontractor on an all risk basis	subcontractor on an all risk basis	subcontractor on an all risk basis

Table 9 :Types of Coverage by Contractors and Subcontractors in Building

7.3.2.4 MF/1

Eaglestone 1990 (75) states that in the MF/1 Subcontract Form, in accordance with Clause 12 the subcontractor is to be included as a co-insured (joint insured) under the insurance required from the main contractor by Sub-clause 47.1 (Insurance of Works) and 47.2 (Extension of Works Insurance) under the main contract.

By Clause 12.1 the contractor gives details of his C.A.R. policy of insurance in respect of the works in Part I of the seventh schedule of this subcontract and includes the subcontractor as a co-insured. In accordance with Clause 12.2 the subcontractor is required to effect insurance against such risks as are specified in Part II of the seventh schedule and indicate the sums insured and the persons to benefit. Clearly, as the subcontractor is a joint insured in the main contractor's C.A.R. policy such a policy will not be required from the subcontractor, which leaves Part II listing the liability policies which are required from the subcontractor.

7.3.3 SUMMARY

Summarising the above findings, we find that according to the insurance requirements of the different forms of contract, the strategy for insuring subcontracted works differs. For JCT86 and MF/1, the strategy may have been the same where subcontractors need not insure their parts of the works which are insured by main contractors as there is no requirement for them to do so in their subcontract forms. It is similar in the sense that subcontractors are not required to provide insurance for their works. However, it differs in the sense that subcontractors may need to insure their parts of the works for risks other than fire and special perils under JCT86. For JCT63 and JCT80, even though there is no requirement for subcontractors to insure their works, they may need to do so as the main contractor might not insure the whole of the works on an all risks basis. For civil engineering forms of contract, the requirement for subcontractors insuring their works is optional and one may tend to think that the strategy for requiring subcontractors to insure their parts of the works is the one which is always adopted in practice. In Section 7.5, the author will show that this is not the case. He will also show that the strategies adopted for disciplines other than civil engineering do not necessarily reflect the requirements in forms of contract. The author is not suggesting breach of contract practices but he will be merely showing that subcontractors may be required to insure their parts of the works even when there is no requirement for them to insure in forms of contract. The author further summarises the differences between the forms of contract for different disciplines in Table 10 shown below;

Civil		Building						Elec and Mech/Process Plant							
Main form (ICE, NEC, GC/Works/1-3rd)		Subcontract form (Blue Form, NEC)		Main form (JCT63, JCT80)		Subcontract form (NFBTE/FASS, NSC/4)		Main form (JCT86)		Subcontract form (NSC/C)		Main form (MF/1, IChemE)		Subcontract form (MF/1, Yellow Book)	
main works	subcontracted works	optional for subcontractors	main works	subcontracted works	no requirement from subcontractors	main works	subcontracted works	no requirement from subcontractors	main works	subcontracted works	no requirement from subcontractors	main works	subcontracted works	no requirement from subcontractors	
All risk basis	All risk basis		specified perils	specified perils		All risk basis	specified perils		All risk basis	specified perils					

Table 10: Insurance Requirements for the Works from Main Contractors and Subcontractors within Forms of Contract

7.4 OPTION MODELS

The literature review has revealed a complex picture where overall strategies are not clearly discernible. This is partly because of differences in terminology between the various forms of contract. It is also a result of detailed differences in risk allocation and insurance requirements, some of which appear subtle and require a detailed knowledge of construction insurance to understand fully. The author does not possess such knowledge and, although he has consulted insurance experts, he cannot be fully confident of his analysis at the level of the most intimate detail. Nevertheless, he has been able to carry out an analysis at the strategic level which is presented in this Section.

If the Works are represented as shown in Figure 11 below, where M plus S equates to the totality of the works;

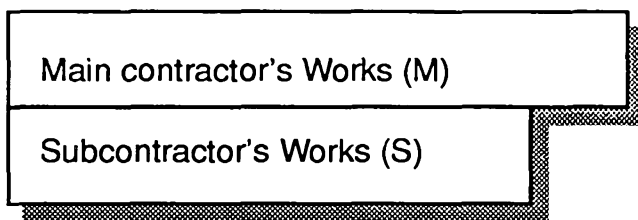


Figure 11: Works Representation

then the theoretical option models may be described as;

- Main contractor insuring M and S along with subcontractor insuring S (Model A).
- Main contractor insuring M and S (Model B).
- Main contractor insuring M and the subcontractor insuring S (Model C).
- Employer insuring M and S (Model D).

The development of these Models can be further illustrated via the Flow Chart shown below in Figure 12;

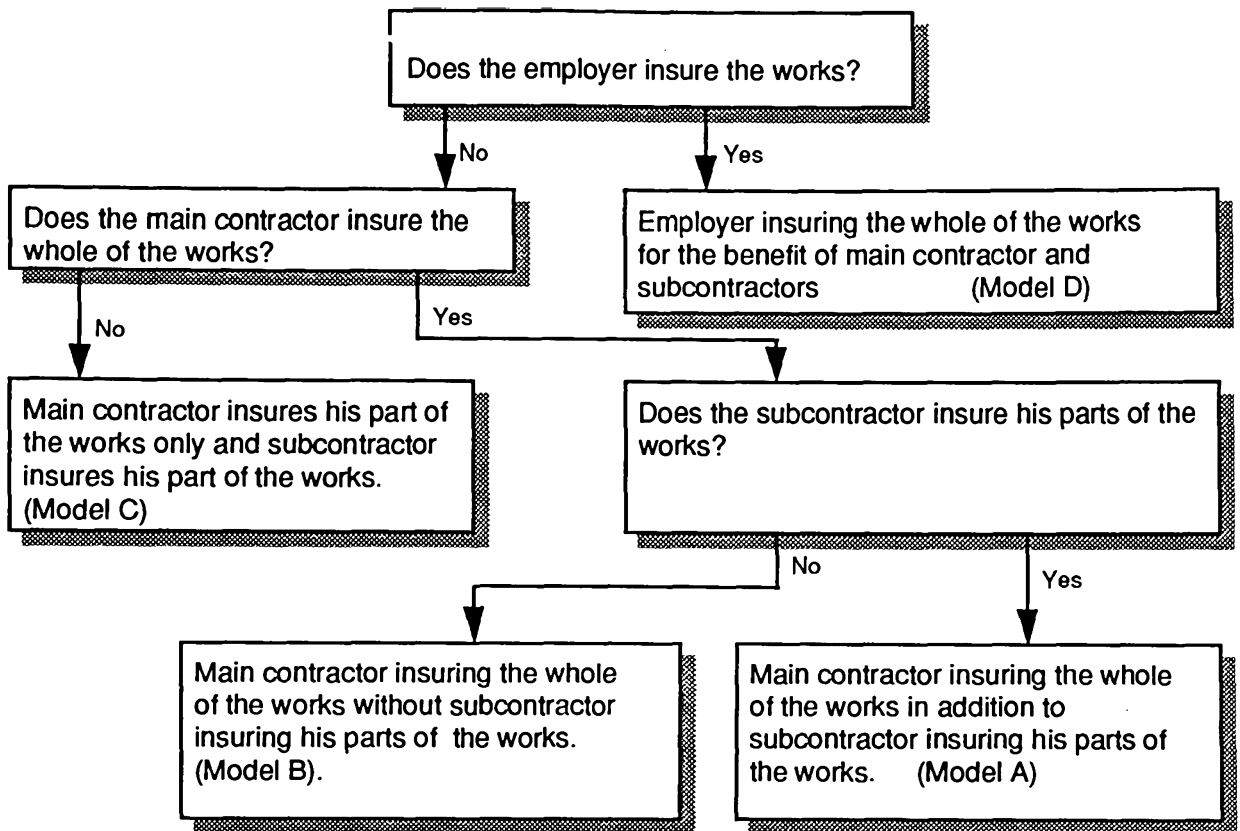


Figure 12 : Subcontracted Works Insurance Flow Chart

The Flow Chart shown in Figure 12 shows the theoretical Models that may be adopted for insuring the works. However it does not show the rationale behind them or the rationale leading to their choice in practice.

Having identified four possible models it is then possible to show the correspondence of these models with the range of contract forms covered by the literature review. This is done in Table 11 which provides a summary of which strategies are used within the different forms of contract.

Discipline	Form of Contract	Associated Subcontract Form	Strategy adopted
Civil Engineering	NEC	NEC Subcontract Form	Either Model A ²⁸ , B or D
	ICE	FCEC Blue Subcontract Form	Either Model A, B or D
	FIDIC		
Government Contracts	GC/Works/1	GC/Works/2	Either Model A, B, C, or D.
	GC/Works/2		
	GC/Works/1	GW/S(Building)	Either Model A, B, C, or D.
	GC/Works/2		
Building	JCT63	NFBTE/FASS Green and Blue Forms	Model B or Model D
	JCT80	NSC/4, NSC/4a and DOM/1	
	JCT86	NSC/C	
Mechanical and Electrical Works	MF/1	MF/1 Subcontract Form	
Process plant contracts	IChemE	IChemE Yellow Book	

Table 11 : Works Insurance Strategies within Subcontract Forms

²⁸ Core clauses of the NEC require Model A to be used. However, the Subcontract Data allows a provision for Model B to be used.

7.5 MODEL ANALYSIS

7.5.1 INTRODUCTION

From the author's analysis of the NEC database of comments, it was clear that different practitioners had conflicting views on the appropriateness of these models. These views were accompanied with different reasoning as to which strategy is more beneficial to those concerned in construction. Some of those comments are outlined in this Section and the author discusses their implications. In this Section, the author also extends that analysis into a more detailed consideration of the reasons governing the adoption of the models in practice. Even though, the models identified in Section 7.4 extend to partial insurance by contractor (Model C) and employer insurance (Model D), the research, however, has revealed that the more predominant ones are Models A and B. The research has revealed that Model C is not used in practice and the author will demonstrate in Section 7.5.4 its impracticality. Model D presents an alternative to main contractor insurance of the works. However, if the main contractor is insuring the works, then the practical choice is between Models A and B. These are therefore dealt with first and more extensively before provision of a discussion on Models C and D.

7.5.2 MAIN CONTRACTOR INSURANCE AND SUBCONTRACTOR INSURANCE (MODEL A)

It has been mentioned in Section 7.3.3 that the policy adopted within the NEC is very similar to the one adopted in the FCEC Blue Form. This policy is for the main contractor to insure the whole of the works as well as provision for subcontractor insurance (Model A). It has been stated in the NEC drafting comments by Weddell (89) that the reasons favouring this strategy are;

- a. the subcontractor is more likely to act responsibly if he knows that any claims will affect future premiums.

b. the main contractor will not always know who his subcontractors will be at the start of the main contract, and thus his insurers would otherwise have to insure for an unknown risk.

c. to reflect the common practice whereby a main contractor passes on to each subcontractor a requirement to insure his part of the Works.

d. although in theory this results in double insurance, in practice it covers for a subcontractor going into liquidation or a subcontract terminating in some other way. The proportion of subcontract work in any contract is accordingly taken into account in fixing the main contract insurance premiums.

In addition, Weddell (89) also mentioned that public liability policies should also be the subcontractor's responsibility. Concerning reason (b) above, the research has revealed that in practice main contractors usually have a fair idea about who their subcontractors will be at the start of the main contract (see interview 8, p.8/10). An argument, therefore, may be formulated against it.

Neither the NEC Subcontract Form nor the FCEC Blue Form actually state that the subcontractors have to insure the works. However, interview data (see interview 1, p.1/1, interview 8, p.8/10, interview 9, p.9/14, interview 14, p.14/6) along with an industry survey conducted (see Appendix C, Table 1 (28 contractors included)) shows that the majority of main contractors in the UK construction industry (about 75% of the research sample) tend to adopt Model A for all disciplines (including building, electrical and mechanical, and process plant works). Although standard subcontract forms differ in the way they require subcontractors to insure their parts of the works, the practice in the construction industry seems to be independent from the subcontract form used and the type of works undertaken.

The rationale for adopting Model A tended to be inconsistent between contractors but according to the point of view of some contractors (see interview 1, p.1/1), subcontractors vary in their expertise and therefore in their claims' history (record). As there is variation of subcontractors from one project to the other, main contractors would want to protect their own claims record by requiring their subcontractors to insure their

parts of the works (also see interview 14, p.14/6). Another matter which is considered advantageous by contractors for adopting Model A is that when the subcontractors insure, no claims would be made under the contractor's main policy for matters like, for example, theft of materials from the subcontractor. If a subcontractor is insuring, he is presumed to take more care about theft of materials. It is perceived that it is for this same reason that under the JCT contract, contractors insure subcontract works against fire and special perils but not against theft. Therefore, under the JCT, the main contractor and the employer get the benefit of the C.A.R. cover but that does not extend to the subcontractor for theft of materials. Interview data (see interview 1, p.1/2) also shows that another reason for adopting Model A is that the contractor does not benefit in any way if other Models are used. Even if other Models are used, it is thought to make no difference to the subcontractor's price. It is presumed that the insurance costs will still be included in the tender price, even if the subcontractors are not insuring their parts of the works. Another interviewee stated (see interview 8, p.8/10);

“ The simple reason is that we have never found any benefit in not requiring the subcontractors to insure their parts of the works. Subcontractors have a certain premium that they pay annually and the fact that we ask them not to insure that project for £1m because we will do anyway, produces no benefit to us in any way so they might as well carry it.”

So, in some ways, these arguments support reason (a) above made by Weddell (89) that,

“ the subcontractor is more likely to act responsibly if he knows that any claims will affect future premiums.”

Even though it appears that there are many contractors who hold this view, whether this line of argument is reflected in practice is a different matter. The extent of its validity remains uncertain as can be seen from other commentators on the issue, for example, Bunni (90), who states;

“ Whilst this may appear at first glance to be an attractive proposition, on closer examination it is incorrect for the following reasons:

-A subcontractor who acts negligently resulting in many claims would be penalised more severely if the claim is made against the main contractor's insurance policy because his future employment on other subcontracts would be more in doubt. The main contractor would think twice before employing such a subcontractor and this is a bigger threat than a possible increase in the premium he would have to pay if he makes claims under his own insurance policy. Furthermore, such a subcontractor would even find it difficult to get work from other main contractors because news of his claims would travel fast and far.

-On a different angle, it is doubtful that the contractor's premium would go much higher than he should pay normally because, unlike third party liability and employer's liability insurances, in Contractors All Risks insurance, it is known that each project is a unique contract which carried unique risks and he could easily argue that the experience in one project may not depend on another.

-Accordingly, it is more appropriate to have the Contractors' All Risks insurance policy issued for the whole of the Works and no other individual cover to be available."

One implication of Model A is the prospect of payment of a double premium to the insurance market, once by the main contractor and again by the subcontractor. However, as mentioned before, the main contractor does get a reduction in his premium according to the proportion of the subcontracted works. Interview data (see interview 1, p.1/3) shows that the percentage reduction is dependant on the claims record of the contractor but it is usually between 30 to 40%, if all the subcontractors insure. In practice, however, many contractors do not perceive the issue of double insurance as a problem. In fact, they hold the view that it ensures that there are no gaps, i.e. there are no parts of the works which are left uninsured (see interview 8, p.8/10).

Another aspect of the problem concerns the extent to which subcontractors comply with the insurance requirements placed upon them by Model A. Interview data (see interview 14, p.14/6) along with an industry survey conducted for subcontractors (see Appendix D, Table 1), reveals that subcontractors may not always take out the full insurance. The interviewee stated;

" We would like them to insure their parts of the works. That does not always get incorporated into the subcontract. Some subcontractors will not insure their parts. They would insure their labour and their plant

but not the construction of their works. It is certainly best if the subcontractor can insure the element of the works that he is constructing. It saves us the problem of having to go to our insurers if there is a problem. It is called passing the risk on to the subcontractor. If he made a mistake or his works were damaged, for example, by protesters, and we were asked to carry that risk, and we cannot get our money back, then the subcontractor would be obliged to go to his insurers to claim on his policy and then to pay higher dividends the following year. Having said that, subcontractors will not always agree to that.”

Therefore, even though about 75% of the industry contractors are adopting Model A, we tend to find that there is no adequate reasoning that says that this is the only Model that can be adopted successfully for all parties. It may be beneficial for contractors as it may be producing a reduction in their long term premiums but it may not be the most beneficial for employers and subcontractors. Construction costs may be higher for employers as they would be paying for the double insurance presented by this Model. The author is of the opinion that the rationale presented by contractors for adopting Model A shows that there has not been a thorough investigation and analysis of the benefits and disbenefits of each Model. Their rationale seemed to be somewhat shallow and there appears to have been little attempt to demonstrate the weaknesses of the arguments against it. Their adoption of this Model seems to be for the sole reason that it is the most pragmatic approach for them. In Section 7.5.3, the author will show that there are contractors who are adopting Model B successfully.

7.5.3 MAIN CONTRACTOR INSURANCE ONLY (MODEL B)

Apart from the majority who tend to adopt Model A for all disciplines, the research has revealed that there is also a small number of contractors (about 15% of the research sample) who adopt Model B for all disciplines. The third group of contractors (about 10% of the research sample) tend to use different Models for the different disciplines of their individual projects. For this group, the research has also found that there is no consistent association of either Model with a particular discipline. According to one of the industry surveys conducted by the author (see Appendix C, Table 1), there are contractors who use Model B for civil engineering works and Model A for building, mechanical and electrical, and process plant works. There are also contractors who adopt

other combinations for their works (see Contractors 3, 9, 21, and 23 in Table 1, Appendix C). Through interview data, the author has tried to establish the rationale behind the adoption of Model B for particular disciplines and the rationale for the adoption of Model B for all disciplines. The author presents these findings in this Section.

Interview data (see interview 1, p.1/2, interview 2, p.2/4) reveals that for some contractors Model B is used for the building sector for the main reason that, unlike civil engineering, where the works are split into different components or units, building usually consists of one unit only, for example, a tower block. The argument is that in building, therefore, it would not be easy to separate the risk for each part of the works and also, it may not be easy to allocate the responsibility among subcontractors in case of damage to the works. On the other hand, civil engineering contracts are usually split up into different components, for example, the road, the bridge, drainage work etc.. As an example, the whole of the drainage work could be subcontracted and therefore, it would constitute its own set of risks.

The validity of this argument is not shared by all contractors in the industry. As mentioned earlier, the research has established that there is no consistent association of either Model with a particular discipline. As an example, one contractor (see interview 9, p.9/15) uses Model B for civil engineering works and Model A for other disciplines and the interviewee stated;

“It is just something that is ‘custom and practice’.”

This does little to enhance understanding of the underlying rationale. However, further interview data (see interview 7, p.7/6) reveals that one reason that some contractors may be using Model B for both civil engineering and building may be solely that their subcontractors are unable to insure their parts of the works. The interviewee stated;

“In many instances, they could be one-man subcontractors who may be unable to insure their parts of the works.”

The relative lack of usage of Model B by the industry has hindered the author's attempts to obtain a rationale for its use. However, Bunni (90) argues strongly in its favour;

“ Mainly, there would be duplication of insurance policies and thus of costs if every subcontractor was required to insure his portion of the work. Nearly 10% of the premiums charged in respect of insurance are charged for administrative purposes. Thus this overlap of insurance is unnecessary and costly. It would be much better if the main contractor issued one C.A.R. policy for the whole of the Works and charged his Subcontractor proportionate amounts of the premium in respect of their work. The above does not apply to the Employer's Liability policies which should be treated differently in that they should be taken out by each Subcontractor. However, Third Party Liability policies can be treated either way because on the one hand they are quite cheap to obtain and on the other they could reflect the experience of the Contractor when premiums are considered.”

Even though the percentage for administrative charges is stated here, it should be noted that interview data (see interview 1, p.1/3) shows that this percentage is usually not known at large by the construction industry and that insurance underwriters would prefer to keep it confidential.

Bunni (90) suggested that the arguments for adopting both main contractor and subcontractor insurance (Model A) would be biased because they were likely to reflect the views of insurance brokers or insurers. In Section 7.5.2, the author outlined Weddell's (89) reasons for adopting Model A. Bunni attempted to counter each reason by the following;

“ That the main contractor will not always know who his subcontractors will be at the start of the main contract, and thus his insurers would otherwise have to insure for an unknown risk:

-This is not a serious point unless the subcontract is for a major part of the works in which case he will know the identity of the subcontractor. In practice the main contractor would be responsible towards the employer and under the contract with him for the whole of the works irrespective of whom he appoints as his subcontractors. The responsibility is a heavy one and the main contractor is unlikely to treat it lightly by choosing his subcontractors lightly. The problems he will pose for himself in delays and bad workmanship will far exceed the insurer's problems in paying for loss of damage and injury. Thus for any respected main contractor, an insurer would leave the matter of whom he chooses for a subcontractor

to him. In this respect, theory is one thing, practice is another. Thus few insurers would bother themselves with the identity of the subcontractors unless such subcontract would form a major part of the main contract and in this case the subcontractor would be known.

That is the common practice for a main contractor to pass on to each subcontractor a requirement to insure his part of the works:

-This is only in markets where the ICE Form or similar forms make that requirement. The concept is attractive from the insurance brokers point of view because in one contract there will be many insurance policies issued instead of one and for each of these the insurance broker takes his commission. Brokerage commission for C.A.R. policies is on the high side and is around 20% and sometimes goes as much as 30%. From the insurer's point of view the risk is shared by many insurance companies and rarely does the main contractor get a proportionate reduction in his premium commensurate with the reduction in risk. Even if he does, there remains the commission which he has to pay to the broker and the administrative costs related to the main policy.

That although in theory this results in double insurance, in practice it covers for a subcontractor going into liquidation or for his contract being terminated, etc..:

This is totally unnecessary under C.A.R. insurance since the main contractor is covered for loss or damage to the Works under his own insurance policy.”

In summary, the research has revealed two different strands of practice. One is for contractors to associate Models with disciplines. The other is for contractors to disassociate Models from disciplines. Only 10% of the research sample follow the first strand and 90% follow the second. It has already been stated that amongst this 90%, 75% adopt Model A and 15% adopt Model B. The question that present itself, therefore, is, should the choice of Model be discipline related? The research has not revealed strong arguments to do so although the lack of ability of very small subcontractors to insure may have substance and lead to the adoption of Model B for certain types of projects, but not necessarily disciplines. The fact that 10% of the research sample associate models with disciplines may suggest that they recognise an alignment between models and disciplines or they may be following ‘custom and practice’ within a particular discipline. However,

the lack of consistency of model adoption by discipline within this group weakens the argument that there is recognition of an alignment between models and disciplines.

The 'theoretical' debate, encapsulated by the contributions of Bunni and Weddell, also reveals two strands, which do not appear to be related to the question of discipline or type of project. Here the debate mainly focuses on the cost-effectiveness of the different models of insurance. Given that 90% of contractors dissociate models from disciplines and that the 'theoretical' debate appears to be independent of that issue, it would seem that the most fruitful area of further work would be to test the validity of the opposing views on cost-effectiveness of the two models.

7.5.4 MAIN CONTRACTOR INSURANCE (PARTIAL) AND SUBCONTRACTOR INSURANCE (MODEL C)

This Model has been considered by the author in a purely hypothetical manner as it was not found to be used in practice. It is included to ensure for full consideration of all the possible Models for insuring subcontracted works. The underlying premise for it is that it may be possible to shift the responsibility of the subcontracted works from the main contractor to subcontractors. This would be done on the basis of a contract similar to collateral warranties and would avoid the need for main contractors to insure subcontract works. However, it faces the problem that subcontractors are not parties to the main contract and therefore their responsibility is not direct towards the employer.

The law specifies and allocates the responsibility for the works between the parties in accordance with the contracts drawn between them. In diagrammatic form, it can be shown in Figure 13 as follows;

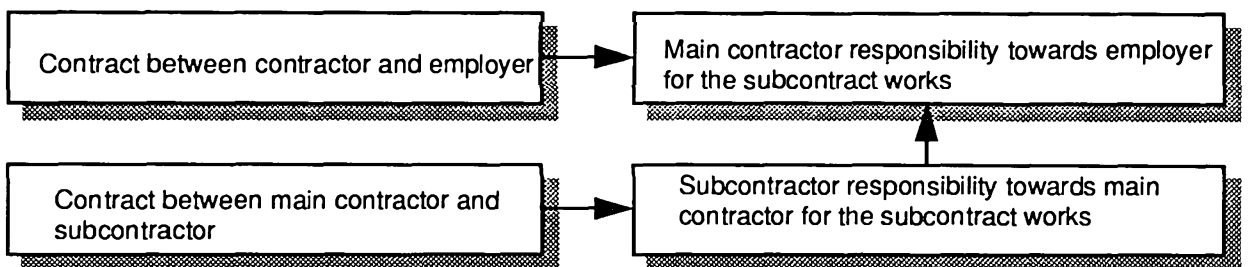


Figure 13 : Responsibility Allocation

Legally, shifting the responsibility for subcontracted works from the main contractor to the subcontractor is possible unless there is express provision in the main contract stating otherwise, which is normally the case. However, even if there is an express provision in the main contract holding the contractor responsible for the whole of the works but there are no insurance requirements (for example, GC/Works/1), the contractor need not insure the whole of the works. Theoretically therefore, it is possible for a contractor using GC/Works/1 to partially insure the works, by excluding subcontracted works, without

being in breach of contract. In practice, however, this is not the case and it can never be for the following reasons. Interview data (see interview 3, p.3/6) reveals that no employer will relieve the main contractor of his responsibility. The employer would want to take legal action against one person instead of several, if any loss or damage occurred to the subcontracted works. Also, bankruptcy of subcontractors forms a threat to employers. Under normal practice the employer can still take legal action against the main contractor.

In addition, since the contractor is held responsible by an express provision and therefore he may be held liable for any damage to the works, it would be in his interest to ensure that the whole of the works are adequately insured. If main contractor's insurance is only partial, then there could be the danger of some parts of the works not being insured by either contractor or subcontractor. Another factor is that the main contractor might not know at the start of his contract which parts of the works will be subcontracted. This implies that the main contractor will not know what is to be insured at the initial stage of the project, and what parts to be left uninsured for subcontractors. The author notes that Bunni (90) appears to have discounted this argument (Section 7.5.3). However, this was in the context of insurers being generally neutral about the identity of subcontractors, whereas the issue here is whether the contractor has complete knowledge of the precise extent of work to be subcontracted.

In summary, the weight of evidence leads to the view that this is not a practical option and this view appears to be totally shared by the industry.

7.5.5 EMPLOYER INSURANCE (MODEL D)

Interview data also reveal that one Model that can be adopted in practice is employer insurance, where the employer insures the whole of the works for the benefit of the main contractor and his subcontractors. Indeed, some employers have adopted the Model in the past (see interview 6, p. 6/14). However, in using this Model, the main contractor may still include the insurance prices to the employer. The interviewee stated;

“ Traditionally, for the larger projects, we have actually insured the works ourselves on the grounds that it is cheaper for us to insure than anybody else. And having put ourselves in that position, traditionally, we have not expected any contractor to provide any form of insurance for the contract works. However, we still end up paying for that because he has a contract works insurance policy and that applies.”

However, it is possible for contractors not to include insurance of the works within their own C.A.R. policies and to rely on the employer to take out an individual insurance policy for the benefit of all parties, including subcontractors. In fact, interview data shows that there are employers who may be willing to adopt this approach (for example, see interview 13, p. 13/9). This may ensure no duplication of insurance and thus reduction in construction costs (premiums to the insurance market) and at the same time, provision of insurance for the whole of the works. Nevertheless, contractors would probably still need to take out C.A.R. policies with insurance of works as they may not know at the time of taking out their policies whether they will win any contracts with employer insurance. Thus the reduction in insurance costs will not be achieved unless either a large proportion of employers follow this model or contractors working in specialised sectors, probably on large projects, know that the employers in that sector regularly and consistently adopt this model.

7.6 INSURANCE OF SUBCONTRACTED WORKS OVERSEAS

Interview data (see interview 1, p.1/1) reveals that for projects which are implemented by English contractors overseas, they may not necessarily require their subcontractors to insure and in this case Model B would be adopted. Contractors would still prefer Model A to be adopted so they would still place a responsibility on the subcontractor to insure their parts of the works. However, the subcontractors may either fail to insure or adequately insure the works and this may be due to a variety of reasons. These may include the lack of insurance market, lack of skill of insurers or a market place which is difficult to do business in. In these circumstances, contractors would cover the risk and it would be described as a contingent risk on the failure of the subcontractor to insure or adequately insure. In effect there would be a ‘back-up’ cover under the contractor’s

policy but it would not be direct cover. The responsibility for a direct cover would still lie with the subcontractor.

The rationale behind the adoption of Model B for subcontracted works overseas has been further ascertained through interview data (see interview 9, p.9/17) which showed that if it is a UK contractor going overseas rather than having an overseas subsidiary, then the works would be insured either by the contractor or by the employer (it also showed that in recent years, it is employers who arrange such policies for the benefit of all parties). If, however, the cover for the works overseas is arranged by the main contractor and the subcontractor is required to insure overseas then according to the contractor's insurers, his insurance policy becomes inoperative for the subcontracted works if the subcontractor's insurance policy is operative. With the use of local subcontractors and main contractor's reliance on unknown insurance market conditions, contractors feel exposed to a potential liability towards the subcontracted works as they would be responsible for it. Contractors, therefore, prefer to use Model B for overseas works.

7.7 SUMMARY AND CONCLUSIONS

The findings of this research may therefore be summarised as follows;

- Standard Subcontract Forms differ in the way they require subcontractors to insure their parts of the works. However, the practice in the construction industry for the choice of Model for insuring subcontracted works seems to be independent from the Subcontract Form used and the type of works undertaken.
- From the sample of main contractors used for this research, it has been found that the majority of main contractors in the UK construction industry (about 75% of the research sample) tend to adopt Model A for all disciplines (including building, electrical and mechanical, and process plant works).

- The rationale for adopting Model A is inconsistent amongst contractors who adopt this Model.
- The research has also established that, sometimes, there is resistance from subcontractors to Model A.
- There is also a small number of main contractors (about 15% of the research sample) who adopt Model B for all disciplines.
- The third group of main contractors (about 10% of the research sample) tend to use different Models for different disciplines for their respective individual projects. The research has also found that there is no consistent association of either Model with a particular discipline amongst those contractors. It is not surprising, therefore, that the research did not identify a high quality theoretical rationale for associating certain Models with certain disciplines amongst those contractors.

The practice in the construction industry for the choice of Model for insuring subcontracted works seems to be independent from the Subcontract Form and the type of works undertaken. By stating this, the author is not suggesting any breach of contract as the flexibility of these forms of contract was shown. It does, however, reflect the preference of the industry contractors to one particular Model (Model A) since most subcontract forms tend to require Model B to be adopted. Contractors seem to be adopting Model A, not only for civil engineering works, but also for building, mechanical and electrical works, and process plant. This, in turn, implies that the reasoning of some contractors to adopt certain Models for certain disciplines is not wholly valid. It certainly shows the possibility that any Model may be adopted for any discipline.

Through his research, the author has been unable to establish a valid reason for the unpopularity of Model B even though the preference of the industry tends to be towards Model A. On the contrary, the research revealed that there are some contractors who are adopting Model B for all their engineering and construction works.

The benefits of Model B is that it mainly ensures no duplication of either insurance or insurance premiums (there is no evidence that subcontractor insurance produces premium reduction for contractors) and in turn this would ultimately cut down construction costs for employers.

Subcontractors do not always agree to Model A, and this may suggest that the reasons of some contractors for adopting this Model (subcontractors make more claims under contractor's C.A.R. policy etc...) may not be as widespread amongst subcontractors as the predominant thought is suggesting. If that is the case, then this builds up the argument further for the use of Model B. As an alternative to Model B, Model D may have equal benefits to all parties.

In this area, the author tends to think that the industry practice has been a case of '*the blind following the blind*' and contractors have been adopting Models just because 'this is the way it has always been done'. However, research revealed that there are contractors who are successfully adopting Model B. Future work can be done in this area to establish whether the success of these contractors has been due to, for example, subcontracting to only a limited and known subcontractors and therefore all the problems encountered by contractors employing unknown subcontractors have not been met. Future work can also focus more on testing the validity of the opposing views on the cost-effectiveness of the two models A and B.

CHAPTER EIGHT: GROUND RISK ALLOCATION

8.1 INTRODUCTION

The concept of risk allocation between the parties to engineering and construction contracts has been, for many years, the subject of many studies in the UK. In these studies, several risks have emerged as being problematic in terms of their allocation. The risk of unforeseen ground conditions remains at the forefront of this group. Ground risks have, for many years, been a source of major problems and a source of conflicts on projects. Contractors face difficulties in setting appropriate contingencies for the risk within their tender prices because of the uncertain nature of the ground and this has sometimes been compounded by the difficulty in interpreting data from site investigation reports, which sometimes proved to be inaccurate. The problem is further amplified by the difficulty of finding precise wording in standard contracts that clearly defines the risk allocation boundary. This has led to a considerably high level of conflicts and disputes between the parties to contracts, at site level and above. The problem of the wording of the existing clauses that allocate the risk has also generated the perception that the way they are drafted does not motivate contractors to manage the risk effectively. On the contrary, it seems to motivate claimsmanship for some contractors.

During the development of the NEC, the drafting team considered the means of allocating the risk at great length. The result of their deliberations is Clause 60.1(12) of the NEC. Part of the research of the author has been to investigate the adequacy and suitability of the Clause over its counterparts in other standard forms. The research also considered different Models for allocating the risk. Amongst those Models, the author investigated the possibilities of allocating the risk to the employer, to the contractor, and sharing the risk between the employer and the contractor. The findings of this research are presented in this Chapter.

The research first considered the literature on ground risk and this is presented by the author in Section 8.3. Option models for appropriate risk allocation of ground risks were then developed and these are outlined in Section 8.5. An analysis and discussion for each of the option models is provided in Sections 8.6, 8.7, 8.8 and 8.9 respectively. Finally, the author presents his summary and conclusions in Section 8.10.

8.2 HYPOTHESES

- Co-operative risk sharing techniques between the client and the contractor may provide a more suitable means of alleviating some of the problems posed in the industry. In particular, they may provide a more suitable means of alleviating some of the problems posed by the risk of ground conditions.
- The concept of offloading more risks to the contractor may be adopted more widely with benefit to both parties to engineering and construction contracts.

8.3 LITERATURE REVIEW

8.3.1 INTRODUCTION

A large number of authors have addressed the problem of ground risks and therefore there is extensive literature on the subject. But, as this subject is only part of the thesis, only some of the most relevant literature, sufficient to set the framework for the work that follows, is included.

Before reviewing the different authors commentaries, Section 8.3.2 outlines the clauses that allocate the unforeseen physical conditions within forms of contract for different sectors of the industry.

8.3.2 GROUND ALLOCATION CLAUSES IN FORMS OF CONTRACT

Table 12 outlines the different construction disciplines considered during the research with the most common associated forms of contract;

Discipline	Form of Contract
Civil Engineering	NEC
	ICE 5th & 6th
Civil (International)	FIDIC 4th
Government Contracts	GC/Works/1
	GC/Works/2
Building	JCT80
	JCT86
	MW80
Mechanical and Electrical Works	Model Form A, Model Form B3 & Model Form MF/1
Mechanical and Electrical Works (International)	FIDIC 3rd
Process plant contracts	IChemE (Red and Green Books)

Table 12 : Engineering and Construction Disciplines and Forms of Contract

The relevant parts of the clauses of the most widely used contracts are outlined here, starting with the ICE Conditions of Contract 5th Edition (48). Although superseded, this form is still used for civil engineering contracts. Its Clause 12(1) states;

“If during the execution of the Works the Contractor shall encounter physical conditions (other than weather conditions or conditions due to weather conditions) or artificial obstructions which conditions or obstructions he considers could not reasonably have been foreseen by an experienced contractor and the

Contractor is of the opinion that additional cost will be incurred.....he shall if he intends to make any claim for additional payment give notice.....”

The ICE 5th Edition has been superseded by the ICE 6th Edition (46). Within the ICE 6th Edition, the only difference in the Clause is that it has been split into three separate sub-clauses but otherwise the text is the same as the 5th Edition. The Clause is also the same within the ICE Design and Construct Conditions of Contract (47). Eggleston (91) showed that Clause 12 of the ICE 6th Edition retains the same principles of Clause 12 of the ICE 5th Edition. The test for payment remains that of conditions which could not reasonably have been foreseen by an experienced contractor. However, there is a new Clause 11(1) which states;

“ The Employer shall be deemed to have made available to the Contractor before the submission of the Tender all information on the nature of the ground and sub-soil including hydrological conditions obtained by or on behalf of the Employer from investigations undertaken relevant to the Works.

The Contractor shall be responsible for the interpretation of all such information for the purposes of constructing the Works and for any design which is the Contractor’s responsibility under the Contract.”

There is also a new Clause 11(3)(a) which states;

“The Contractor shall be deemed to have based his Tender on the information made available by the Employer and on his own inspection and examination all as aforementioned.”

In the light of those new clauses, Eggleston (91) states;

“the foreseeability test comes under severe pressure in claims based on the ICE 6th Edition.”

The FIDIC Conditions of Contract which are internationally used and which are based on the ICE Conditions also include similar clauses to Clause 12 of the ICE Forms. Clause 12.2 of the FIDIC 4th Edition (66) and Clause 11.3 of the FIDIC 3rd Edition Conditions (65) for electrical and mechanical works state similar wording to the ICE 5th and 6th. It

should also be noted that Clause 12.2 remained the same after the editorial amendments in 1988 and the latest further amendments in 1992 (92).

Forms GC/Works/1 (49) and GC/Works/2 (67) for government contracts contain a common clause. The contents, however, are significantly different from the ICE and the FIDIC Forms, with the exception of Clause 2(1) which is similar to Clause 11(2) of the ICE Forms. Within Form GC/Works/1 Clause 2 states;

“2(1): The Contractor shall be deemed to have satisfied himself as regards the nature of the materials (whether natural or otherwise) to be excavated, the conditions under which the Works will have to be carried out,

2(2): No claim by the Contractor for additional payment will be allowed on the ground of any misunderstanding or misinterpretation in respect of any such matter nor shall the Contractor be released from any risks or obligations imposed on or undertaken by him under the Contract on any such ground or on the ground that he did not or could not foresee any matter which might affect or have affected the execution of the Works.”

Within the JCT80 (68), Clause 26 is the clause which refers to loss and expense by matters materially affecting regular progress of the works. The matters referred to are outlined in Clause 26.2. Unlike other forms, it does not include any reference to unforeseen physical obstructions which might be encountered during the progress of the works and which might affect its progress.

Clause 5.7 of Model Form MF/1 (50) for mechanical and electrical works states;

“ In the case of work underground or involving excavation where the actual conditions of the ground are not stated in the Contract or if rock, rocky soil, solid chalk, water, running sand, slag, pipes, concrete or other obstructions are found, and such conditions or obstructions could not reasonably have been ascertained from an inspection of the Site by the Contractor before he prepared the Tender or from information made available to the Contractor for the purposes of the Tender, or if it should be necessary to leave in timber or provide support for existing work (such necessity not having been indicated in the Contract), the Contractor shall forthwith inform the Engineer of the obstructions or hazards encountered

.....If the Contractor in taking such steps incurs extra Costs, such Costs shall be added to the Contract Price.”

The IChemE Form for process plants contracts (Red book for lump-sum contracts) (52) has Clause 5.3 stating;

“ If during the execution of the Works the Contractor encounters on the Site any conditions (other than conditions resulting from weather conditions experienced at the Site after the Date of the Contract) which would not reasonably have been foreseen at the date of tender by an experienced contractor possessed of all the information which the Contractor then had or could have obtained by visual inspection, and if the Contractor considers that he will in consequence of such conditions incur additional Cost or Expense in performing his obligations under the Contract, then he may give the Engineer a notice.....”

Finally, the NEC, which is the most recently published Standard Form of Contract and which is multi-disciplinary, has Clause 60.1(12) listed as a compensation event to the contractor. It states that it becomes a compensation event if;

“ The Contractor encounters physical conditions within the Site, other than weather conditions, which, at the Contract Date, an experienced contractor would have judged to have such a small chance of occurring that it would have been unreasonable for him to have allowed for them.”

Clause 60.2 of the NEC states;

“ In judging the physical conditions, the Contractor is assumed to have taken into account

- the Site Information.
- publicly available information referred to in the Site Information.
- information obtainable from a visual inspection of the Site and
- other information which an experienced contractor could reasonably be expected to have or to obtain.”

and, Clause 60.3 of the NEC states;

“ If there is an inconsistency within the Site Information (including the information referred to in it), the Contractor is assumed to have taken into account the physical conditions more favourable to doing the work.”

Uff (93) shows that the English law will ordinarily place the risk of ground conditions on the contractor^{29,30}. From the literature considered, it appears that only government contracts adopt this position as they expressly allocate the risk to the contractor. However, the ICE Forms, FIDIC, MF/1 and, the IChemE Red Book partially allocate the risk to the contractor using the concept of the ‘foreseeability’ test. The NEC, however, goes a step further by introducing the concept of probability in partially allocating the risk.

8.3.3 GROUND RISK ALLOCATION HISTORY

In 1982 Abrahamson (94) provided a history of the allocation of the risk arising from physical conditions. Some of this is outlined below starting with what was prevailing in the common law system;

“ The Contractor shall be deemed to have inspected the Site and its surroundings and to have satisfied himself before submitting his tender as to the nature of the ground and subsoil...the form and nature of the Site... and in general to have obtained for himself all necessary information... as to risks, contingencies and all other circumstances influencing or affecting his tender.”

It follows that any risk arising was totally carried by the contractor. The employer had no obligation to provide any information. Abrahamson ascertains this by stating that;

“originally, according to the common law system, it was held that the owner had no duty to give information to tenderers, and that even if he did and tenderers generally relied on the information that was ‘a usage of blind confidence’³¹ and they had no remedy if it was wrong.”

²⁹ Bottoms v Mayor of York (1892) HBC 4th ed. Vol. II p. 208.

³⁰ Where ground investigation data is provided an express clause may well be necessary to avoid the possibility of part of the risk being effectively transferred back to the employer.

³¹ Thorn v. London Corporation (1876).

However, the position of the contractor has been changed, first by the English law and second by the express provisions in standard conditions of contract. Abrahamson also states;

“ As the above proved to be unsuccessful, change has been made at three levels. After nearly a hundred years some first level help arrived twice over from the general law. From 1963, the English courts have developed a general right to compensation for negligent misinformation. At the same time the legislature intervened to improve the remedies in the UK for misrepresentation³² inducing a contract - by the Misrepresentation Act 1967, now modified and amended by the later legislation. The second and highest level of relief for the contractor is where the starting point of the English law is reversed by the conditions of contract. The FIDIC Conditions (32) in clause 11 appear to require the owner to tell all and positively to guarantee what he tells. Some consultants very fairly specify that factual information provided is guaranteed, although adding the usual disclaimer about the rest of the site information supplied. Such guarantees entitle the contractor to compensation, and in some cases to end the contract, simply on proof that they have not been fulfilled, without proving negligence of fault by the owner.”

Clause 11 of the FIDIC Conditions (66) states;

“ The Employer shall have made available to the Contractor, before the submission by the Contractor of the Tender, such data on hydrological and sub-surface conditions as have been obtained by or on behalf of the Employer from investigations undertaken.....”

Regarding the guarantees of factual information by consultants as subtleties, Abrahamson explains the third level of change in favour of the contractor by stating that;

“the third level is in the middle of the other two, where most of these subtleties have been ignored in the ‘committee’ drafting of clauses specifically giving the contractor some vague relief for adverse ground conditions. Clause 12 of the ICE and the FIDIC Conditions is typical in giving the contractor a right to extra time and money.”

Regardless of how the ground risk was allocated, over the years it has proved to be a major risk in construction projects. It frequently happens that the ground conditions are

³² A misrepresentation is defined as a non true statement of fact which may have induced the other party to enter the contract.

different from those stated in site investigation reports. For example, the area has been described by Aldredge (95), along with many others, as,

“ the most critical risk area in tunnelling and open cut construction projects. Considerable delays and costs due to differing site conditions whether alleged or actual, have been experienced on almost all of its subsurface projects.”

Alhalaby (96) shows quantitative data on the impact of the risk on projects. He stated that;

“ a statistical review of projects from NEDO reports (97,98) revealed that 50% of commercial buildings and 37% of industrial buildings experienced delay due to unforeseen ground conditions. All developments on second-hand sites met unexpected ground during construction. The NEDO reports state that the most frequent origin of overruns and long delays (defined as being in excess of 10 weeks) are unforeseen obstacles in the ground.”

Many authors have provided commentary on the way the risk is allocated between the parties within most forms of contract, but in particular on Clause 12 of the ICE Conditions of Contract. For example, Uff, 1989 (99) stated that;

“ this is a very special sort of risk which depends, not on the actual events that occur, but on what a hypothetical person (the experienced contractor) ought to have foreseen at the time of the contract. It is hardly surprising that this test gives rise to some very peculiar consequences. The extent and nature of the risk which the employer takes on by these words cannot be determined easily or quickly. It requires consideration of potentially complicated factors which, in practice, almost compel the type of searching investigation that usually takes place in an arbitration. This means, in practice, that when serious unforeseen conditions do arise in the course of engineering works, a simple (or indeed any) answer to the question of who is responsible cannot be given. This is why most substantial Clause 12 claims must go to arbitration and why the clause itself is and always has been a contractual disaster.”

Clause 12 has also been under scrutiny by Duncan Wallace in 1974 (100) and 1978 (101). On both occasions, his comments were very similar. He pointed out that Clause 12 did not, at that stage, have an equivalent in building contracts in the U.K., or in GC/Works/1

contracts and he specifically commented on the wording “*could not reasonably have been foreseen by an experienced contractor*” by stating that;

“these words probably give rise to the most frequent disputes of fact which come before engineering arbitrators. The word ‘reasonably’ introduces an element of degree but, even apart from this, the application of the words to a given set of circumstances can be extraordinarily difficult. Engineering arbitrators tend to construe the expression very generously in favour of contractors, particularly in regard to the commonest hazards arising in engineering works, namely wet ground and running sand. This attitude can be very unfair to more prudent contractors who price for such risks and in consequence lose the contract to less prudent or more litigious competitors.”

In 1994, Uff (93) again commented about the drafting of clauses which allocate adverse physical conditions and in this incidence, he compares the NEC Clause with ICE. He states that,

“the clauses are remarkably similar. The NEC version is simply a reworking in language which appears somewhat tighter, but otherwise achieves substantially the same effect, namely that the contractor is to be compensated (and therefore is not to assume the risk, for an occurrence which objectively would not be regarded as material. The wording of the clause, in either case, gives little guidance as to when the provision applies and when it does not. It poses a test which is related in part to what has immediately occurred, but is also dependant on conditions which existed at the date of the tender, and which are likely to be obscure and highly susceptible of dispute at the date of the occurrence.”

Uff (93) also commented on the JCT80 form (68) as follows;

“ ground conditions are solely at the contractor’s risk but subject to the possible effect of the Standard Method of Measurement, in accordance with which the bills are deemed to be drawn³³. Two provisions in the Standard Method are of particular relevance, namely the requirement to measure rock³⁴ and running sand³⁵ i.e. sand subject to a high external water table which becomes unstable when excavated. In neither case is the term precisely defined, but the comparatively low level of incidence of such claims means that the issue is not a critical one for the industry. The major difference is when the contractor encounters genuinely unforeseen and unforeseeable adverse conditions not within either of these classes

³³ JCT80 Clause 2.2.2.1

³⁴ Clause D6(e).

³⁵ Clause D6(d).

then he would find that the additional cost and delay are entirely to his account, whereas under the ICE Conditions or NEC, the unforeseen conditions would lead to full compensation with profit.”

From this literature, we find that the ground risk is a major problem in engineering and construction contracts. We also find that there are many who consider the way it is allocated in forms of contract, to be highly unsatisfactory. This is mainly due to the unclear definition of the boundary that divides the risk allocation and, in particular the difficulty of establishing the foreseeability of the adverse physical conditions or obstructions. Uff’s (93) comment on the ICE 6th Edition neatly captures the essence of the problem:

“when a ground risk occurs which has not been anticipated, instead of having the contractor trying to minimise its effect, he is indulged in the job of trying to establish its unforeseeability by an experienced contractor.”

The author has, therefore, investigated alternative models for ground risk allocation (Sections 8.4 to 8.8).

8.4 ALLOCATION OPTION MODELS

The literature review was predominantly concerned with a legal perception of the problems with the allocation of ground risk in conditions of contract. It is clear that considerable resources and costs are consumed by disputes about ground conditions, including the diversion of effort from dealing with the risk itself. Alhalaby’s (96) statistical analysis also showed a significant commercial effect, with delays to many building projects from ground risks and it can be assumed that additional costs were also incurred.

Further literature suggests that the direct costs and delays arising from unforeseen ground conditions can never be eliminated, however detailed the information about the site might be. For example, Barnes (18) has stated;

“ it seems that no reasonable amount of site investigation can establish ground conditions with sufficient precision to shrink this uncertainty. On the other hand, the importance of an ‘adequate’ site investigation cannot be diminished as the unforeseeability of ground conditions can be reduced by it.”

and Whyte (102) suggests that;

“ground engineering is a high risk element in many construction projects and the problems of ‘unforeseen’ conditions can be minimised by effective site investigation. It seems that this particular uncertainty can be reduced but not avoided.”

Similarly, Thorburn (103) states the universally known fact that;

“geological uncertainties cannot accurately be identified and defined, even by thorough and extensive investigations.”

However, it may be possible to reduce or eliminate the costs and delays of disputes about ground conditions, providing that the risk allocation can be made more clear and precise. In order to test the commercial implications of this approach, the author has sought to ascertain the extent to which additional costs and delays were due to either dealing with the risk itself or to disputes arising from the risk. An industry survey conducted by the author revealed that about 85% of the contractors of the research sample (28 contractors included) have suffered increase in costs and delays within their projects during the last ten years due to disputes which have been the result of unforeseen ground conditions (see Appendix C, Table 3 and Table 4). From a separate questionnaire sent out to specialist subcontractors (see Appendix B), the data collected revealed that during the last 10 years, they were involved in about 10 projects which had increases in cost and duration due to unforeseen ground conditions. In three of those projects, the increases in cost ranged from £33k to £135k for the total cost of projects of £15k to £45k respectively. The increases in duration for the same projects were 6 to 23 months for total anticipated durations of 13 to 14 months respectively. About 30-40% of those figures are losses due to arbitration and litigation.

The problems due to ground risks can therefore be seen to have two main aspects. Firstly, there are the costs and delays that may occur to a project due to the modification of the methods of construction if the ground is worse than expected. Secondly, there are the additional costs and delays that may arise if it is not clear who will bear the costs and delay which fall in the first category. Total elimination of costs and delays in the first category is not possible since it is totally dependant on site investigations and information. The author has shown that site investigations will never be totally revealing, although improvements to practice should be sought to aim for high quality information. The remaining part of the problem is therefore a matter of clear and precise allocation of the risk to one of the parties to eliminate the costs and delays of disputes.

The author has, therefore, investigated investigated six risk allocation models. These are listed below and are further illustrated in Figure 14;

- Model A: Clause 12 of ICE which is based on the foreseeability test.
- Model B: Clause 60.1(12) of the NEC which is based on a probability test.
- Model C: Definition of the foreseeability boundary by a cost-based factor.
- Model D: Co-operative risk-sharing.
- Model E: Risk being offloaded to contractors.
- Model F: Risk being retained by the employer.

The author does not assert that these models are the only ones that can be developed to provide an adequate solution but each one of them has been viewed as having potential to provide a more robust risk allocation.

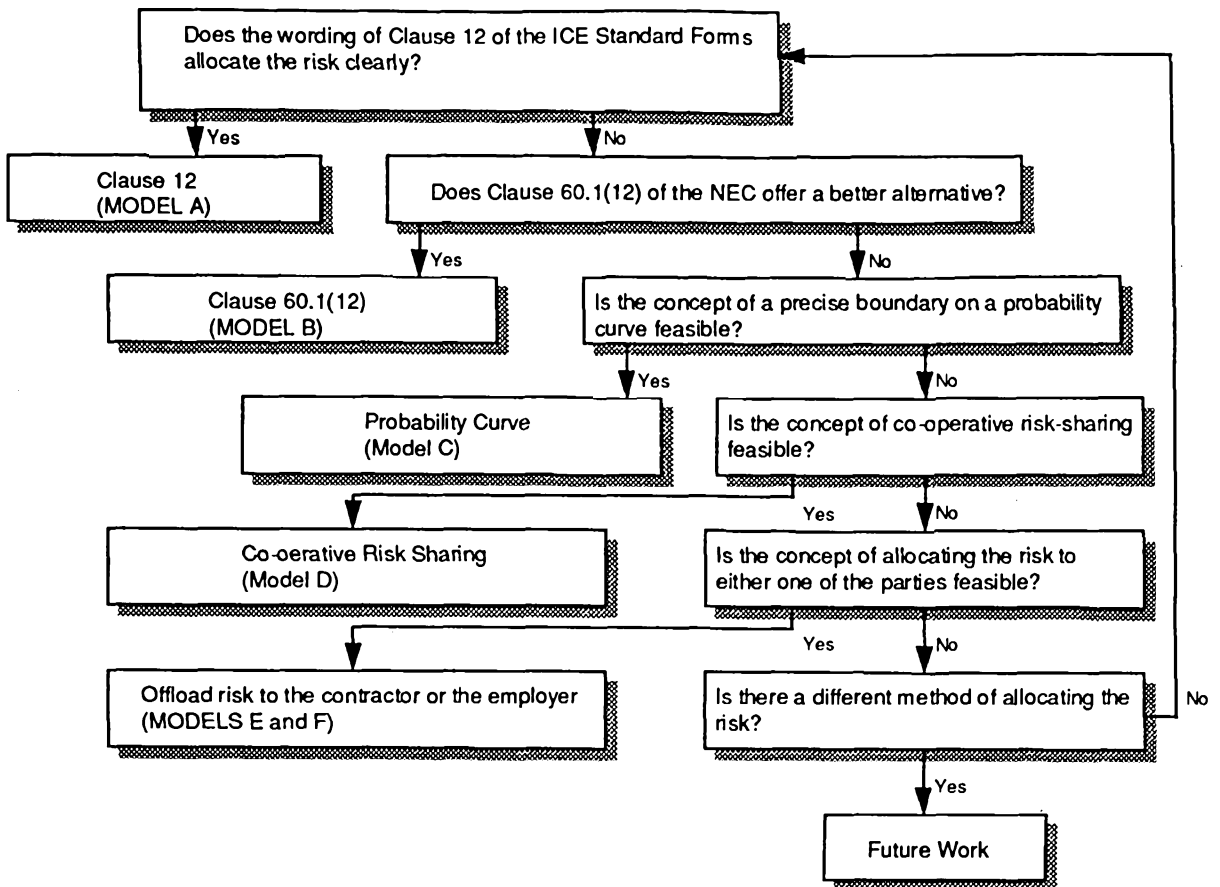


Figure 14 : Ground Risk Allocation Flow Chart

Model A has been discussed through the literature review and has been shown not to provide a clear model of risk allocation. Sections 8.5, 8.6, 8.7 and 8.8 provide a discussion on Models B, C, D, and E respectively. Model F is discussed in Section 8.7.

8.5 MODEL B: NEC CLAUSE 60.1(12)

In this Section, the author provides a review of Model B by including commentary from industry practitioners. The input of many practitioners reflects the view that Model B does not create a radical change from Model A. However, some hold the view that in theory, its boundary limit is somewhat 'tighter' by inclusion of the words '*has such a small chance of occurring*'. For example, one interviewee (an employer's project manager) stated (see interview 4, p.4/1);

" NEC did not create a radical change for the risk allocation. I take more comfort from the fact that the wording of the NEC talks about those that an experienced contractor would regard as having such a small chance of occurring."

However, the interviewee also stated that it is too early to be certain whether the NEC is an improvement;

" By time and through more usage of the NEC, it would be known whether NEC's allocation of the risk is better or clearer than ICE 6th. At the moment, there are not enough case studies."

This view is also shared by others in the industry. As an example, one employer stated (see interview 6, p.6/3);

" I do not think that we have seen any benefits or disbenefits. It is slightly tighter than the traditional ICE."

Nevertheless, not all practitioners agree that Model B provides a 'tighter' allocation than Model A. A legal advisor stated (see interview 16, p.16/6);

" Broadly, the NEC does not allocate the risk any differently than any other form of contract. There are still the same basic provisions. Weaknesses of the NEC clause are that there are no precise limits on it. There is still an interpretation and it still requires people to be reasonable in interpreting."

The author does not disagree with the views expressed above as it is clear that more practical experience with NEC is needed before a judgement can be reached. However,

he believes that the Clause has more potential to affect practice than is implied by the view of the legal advisor. This is because the Clause abandons 'reasonable foreseeability', which is totally subjective, in favour of a probability concept. There is an assumption within the Clause that contractors can, or should become able to, classify ground risks by large or small chance of occurrence. This has the potential to motivate both employers and contractors to define the boundaries between these two categories in terms of the nature of the ground itself. The ultimate goal would be to establish a probability curve of the ground conditions so that the need to interpret the meaning of "small chance of occurring" is avoided, as it would be replaced by a probability value. This concept is developed further in the next Section of the thesis.

8.6 MODEL C: PROBABILITY CURVE

The difficulties that may arise from the ground during construction are various and because of the diversity of the nature of difficulties, historically, it has not been possible to assign a full probabilistic approach to the allocation of ground risks. As an example of these difficulties, Billam (104) provided some examples of problematic ground which are outlined here to show the extent of the difficulty of assigning a probabilistic approach;

“ Construction difficulties could arise from soil, rock or groundwater conditions. There could be difficulty of extraction and problems in the suitability of construction materials. There could be pollution of the site from previous use or just from neighbouring factories. Problems could arise from instability and drainage on surrounding buildings or other property, if the site is to be used. Failures of foundations, retaining walls, slopes and natural features are also common. These are just a few examples from a long list that shows the extent of the unforeseeability of the ground.”

However, some suggestions have been made for a probabilistic approach. For example, Durkin (105) has suggested that;

“the test of the foreseeability should be based on the “probability” that an experienced contractor could have foreseen such events as contemplated in Clause 12.”

This seems to suggest that the concept of probability should be applied to the foreseeability of events rather than their occurrence. In the author’s view, the proposal has not been taken forward for two reasons. Firstly, to judge the probability of foreseeability borders on the impossible. Secondly, if it were tried it seems likely to be the subject of dispute and will not solve the underlying problem. It, therefore, seems preferable to focus on the probability of occurrence of the risk itself.

Perry et al (2) have considered this in the context of both adverse weather and ground conditions. They state that;

“ In the NEC, a probabilistic approach has been used to allocate the weather risk. However, with the ground risk, a full probabilistic approach has not been possible. One reason was that probability data on ground conditions was simply not available in the way it was for weather.”

The author has explored this concept further using a probability distribution curve as shown below:

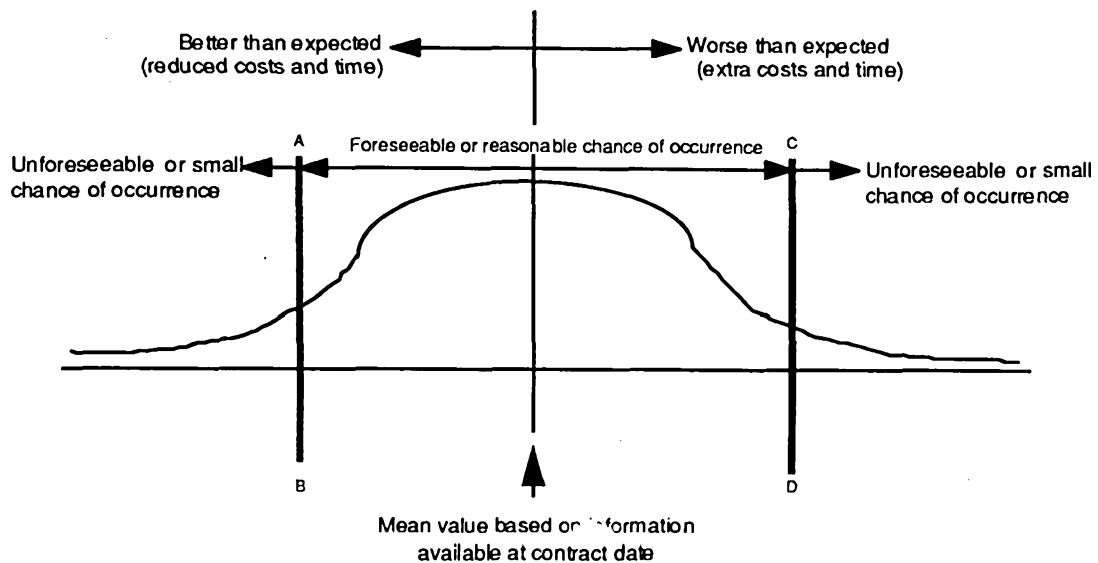


Figure 15 : Probability Distribution Curve for Ground Risk

Figure 15 shows a probability distribution curve for the ground condition risks that might occur during the lifetime of a project. The mid-point of the curve represents the mean value, which would be based on all the information available about the ground.

The A-B and C-D boundaries are not relevant under certain contract strategies or forms of contract. For example, in a cost-reimbursable contract the employer carries all the risk of overrun and receives all the rewards of underrun for any departure from the mean. In some government contracts, as discussed earlier in the Chapter, it is the contractor who sustains all the rewards or losses for any departure from the mean. However, if it was possible to define the C-D boundary then it would be equally possible to define the A-B boundary. This would open up the prospect of an express provision for the allocation of

better than expected ground conditions. To the author's knowledge, this has never occurred in contract forms, but it could be an attractive option to those employers who feel that current forms are unfair to them, as they work in only one direction.

The key issue is the difficulty of defining the boundaries and in most contracts the concern has been with the C-D boundary. The definition of that boundary has yielded conflicts. Weaknesses of the relevant clauses within conditions of contract are that there are no precise limits. They are open to different interpretations. The ground has too many parameters and therefore it has always been difficult to put very precise limits to it. Nevertheless, some limits could be used based on the ground parameters but that is only possible for specific projects. As an example, it might not be known where the interface between gravel and clay is within the ground. So tolerance limits could be specified in that case. However, what is needed is an establishment of the fact that it is only gravel and clay that would be found. A report published by CIRIA (106) outlines this in the form of 'Ground Reference Conditions'. It states that the Reference Conditions will comprise a description of the materials present, their geological structure and the ground water regime as deduced from the ground investigation. It also states that where the ground is largely unknown or known to be highly variable, the Reference Conditions would so state. The NEC uses the same concept. The NEC guidance notes state the following;

“ One method of reducing disputes on the topic (ground conditions), is to define in the contract the boundary line between the risks carried by the Employer and Contractor, i.e. establish what tenderers should allow for in their tenders. This can be done, for example, in tunnel works or extensive foundation works by stating the limiting boundary conditions.”

One approach to using a probability distribution curve is based on the assignment of a cost factor to the boundary. Instead of defining the C-D boundary by the foreseeability/unforeseeability of the event, it may be possible for it to be defined as events which result in an amount exceeding £x deviation from the actual cost. This cost factor may be specified at contract date. This method can result in the advantage of the usage of the same value for both sides of the curve.

One problem with this approach is that it requires a knowledge of the actual cost of dealing with the risk. On cost-reimbursable and target cost contracts, this information is available to the employer through open book accounting. On priced contracts, this is not usually the case. However, the NEC procedure for compensation events is based on a forecast of the actual cost of dealing with the event and the amount of the forecast has to be justified by the contractor. This may provide a means to enabling the approach to be used on priced contracts. However, there may be other problems inherent in the approach and further work is needed.

A similar model has been suggested before. Uff 1994 (93) stated that;

“it has been suggested that one means of avoiding the impact of ICE Clause 12 would be to transfer the risk in part only by providing (or allowing the contractor to tender) a percentage of the additional cost to be recovered. This would provide an incentive (depending on the percentage figure) to the contractor to avoid either encountering adverse conditions which he might suspect to exist, or incurring additional cost, the full extent of which he would not be entitled to recover. The principle of risk sharing in this way could apply equally to ‘unforeseen conditions’ clauses based on reference conditions or on warranted site reports.”

The author has not been able to research in detail the technical and commercial aspects of a full probabilistic approach or cost factor approach. However, the NEC procedure for compensation events, which yields more open and shared cost information, perhaps coupled with some further development of ground reference conditions, seems to warrant further research. The establishment of clear boundary conditions for the ground, together with a more collaborative approach to forecasting the effects of encountering conditions which are outside the defined boundary, should have a considerable beneficial impact on the extent and costs of disputes.

8.7 MODEL D: RISK SHARING

One of the models for risk allocation which is being tried in current practice is accommodated within 'alliance agreements'. The fundamental principle is that the parties share all the risks and rewards of a project in a balanced way. Scott (107) shows that 'alliance agreements' are based on a fundamental shift in the nature of the relationships between clients and contractors - a shift which has seen all parties put aside their previous adversarial approach and, instead, pool their skills, expertise and resources to find creative solutions which allow their individual business goals to be achieved.

Ashley (108) provides the theoretical basis for risk-sharing relationships. He states;

“ risk-sharing relationships have been divided into two classes: co-operative and non-co-operative. Co-operative risk sharing, typified by the joint-venture partnership, relies on one of three methods for risk division:

a. Subscription;

By requesting each company to determine what share of the project it desires, the initiating executive allocates by subscription. When enough subscriptions are received to total 100%, then the joint-venture is formed.

b. Equal partnership;

The method of equal partnership seems to be the most equitable approach for a highly desirable project. Each company contacted by Company A is given an equal share of the endeavour, so for a three-party joint venture each would receive a one-third share.

c. Allocated shares by sponsor;

The sponsor will normally allocate the largest share to himself and partition the remainder to the other partners. This partition may be equal shares for contractors of approximately equal resources, or may be aligned toward the special contribution of each.”

Non-co-operative risk-sharing methods are;

a. Complete transfer of all risk to contractor.

b. Owner (designer) division of risk

In this approach, the owner or designer/engineer acting as the owner's representative draws up a contract between owner and contractor in some sort of equitable fashion. A guiding principle for the contract maker is that each risk element should be distributed such that the effect on the total expected project cost is minimised.

c. Negotiation

Negotiation is another procedure for determining the clauses of a construction contract and provides the owner with feedback on the relative cost of including each contract clause. A strategic interaction between owner and contractor allows a contract to evolve which optimally distributes the risk elements.

It is possible to form a percentage-sharing device for sharing a single identified risk element. For example, labour escalation may be shared 60% by the owner and 40% by the contractor."

Ashley concludes that the conflicting goals of employer and contractor usually lead to non-co-operative risk-sharing;

"owner and contractor relations are marked by conflicting goals which lead to non-co-operative risk-sharing. The owner strives to minimise his costs while the contractor attempts to maximise his profits. Standardised contracts and experienced owners are often instrumental in alleviating the conflicts, as are competent engineers acting as consultants to the owner."

Despite Ashley's conclusions that the conflicting goals of employers and contractors lead to non-co-operative risk-sharing, it has been reported in 1993 (109) that;

" an oil company has decreased a quarter off the expected cost of building and installing a North Sea gas platform by using a partnership type agreement with its contractors. The costs decreased from £50 million to £38 million by sharing risk. The two contracting partners were prepared to risk losses if any event occurred but instead the profit increase was from £3 million to £3.6 million. The client revealed the huge savings on the project. The concept helped the contracting parties to work as a single team and the whole project came in well under the tight budget and months ahead of schedule. The split for reward

or risk for the client was 45%, 30% for the first main contractor and 25% for the second main contractor.”

The concept of co-operative risk-sharing within the ‘alliance agreements’ may, therefore, provide a solution that may eliminate the costs that are incurred in dispute resolution processes when a ground risk occurs. It may also save the time lost during these resolution processes. Strauss (110) stated that;

“ it would be unrealistic to expect the designer, owner, or contractor to subordinate his own interests to any of the others but awareness of each other’s risks, together with a willingness to share some risks, and acceptance of those risks which cannot be shared, will certainly lead to a diminished risk for all. Although risk cannot be eliminated, its effects can be mitigated by awareness, evaluation, and sharing. When applied to what must be a co-operative effort, the old adage that ‘God helps those who help themselves’ should be modified by adding ‘and help others’.”

The above shows that the concept of co-operative risk sharing between the parties to engineering contracts may be viable if the terms are agreeable to both. In fact, there are more calls within the industry for this type of risk sharing approach. Morrison (111) stated that;

“ Too much time is lost in disputes and partnering arrangements are needed for public sector projects and a fundamental change is needed to replace the adversarial approach.”

In his paper, Scott (107) stated that BP sees the main principles that should be included in any alliance arrangement as;

- “ - A primary emphasis on the business outcome for all parties.
- A commercial basis which offers the opportunity to achieve rewards commensurate with exceptional overall performance measured against clear predefined targets and in which risks and rewards for the parties are equitably balanced.
- Individual and collective responsibilities and accountabilities clearly understood and defined.
- Access to and contribution by the expertise and skills of all parties.
- Openness and co-operation between the parties.
- Encouragement to develop and apply innovative approaches and achieve continuous improvement.”

One main factor that usually stands in the way of this approach is the alignment of both parties' objectives. However, in an interview with the author (see interview 13, p.13/1), Scott stated;

“ People believe that it is not possible to reduce costs and enhance profits. They assume that if costs are down then profitability must go down as well. We are finding that as costs go down, the profits accrued by contractors are increasing. They are increasing quite dramatically in some of the ventures that we have been involved in. I believe it is perfectly possible for contractors, not only to get the levels of profit that they would normally expect but actually to get levels of profit way beyond expectations. This can be achieved by working with the clients to reduce costs if it is clear that there is a sharing in the cost reduction.”

The contract strategy of the alliance agreement is similar to a normal target cost contract. The main difference appears, not within the contract strategy itself, but within the attitude of the contributors to the project. Scott (see interview 13, p. 13/2) stated the following;

“ I suppose that it is not dissimilar from target cost projects but I actually think there is a bit of a difference here. There is a fallacy in the industry (in most industries, including our own) that it is the contract and the way the contract is constructed that helps to deliver the results or even as the main driver in terms of results. My view is that the results are delivered by people. And the contractual arrangements, including the incentives that are there, whilst important, they are there more, in my view, to underpin the sort of behaviours that are needed within the team that is going to deliver the results, rather than being there to drive the behaviour. I think that most people look at contracts as being things that drive behaviour and I just happen to disagree with that. If you really want to get good results on a project, then the challenge is; how do you get the project team (in our case, that project team consists of BP people and contractors people) to be committed to delivering the project with a result that at the outset it is not even known how it will be achieved?”

On the other hand, we find that Perry (112) states;

“ Contract forms can influence culture and behaviour. Where contractual arrangements and forms were designed to engender collaboration this was welcomed with enthusiasm by the more senior staff. Experienced, but less senior staff were not always comfortable with collaborative working and sometimes made little attempt to alter their normal behaviour patterns.”

There is a very subtle difference between those two points of view. The former suggests that attitudes and behaviours are the main drivers for the success of a project whilst the latter suggests that contractual arrangements and forms shape up the attitudes and behaviours for the success of a project. The author had the opinion that, whilst a more positive attitude in a team may drive it to achieve better results, contractual arrangements may still be used to underpin these attitudes. The interviewee commented on this as follows;

“ It is a plausible argument that the contractual arrangements would have a direct effect on the attitude of contractors but the fact of the matter for me is that we have had contractual incentive arrangements ever since I came into the industry. The results we achieved have been patchy at best. They have worked on some occasions and they have not worked on others. I think that within BP, we are now beginning to develop a consistent track record of actually delivering projects at reduced costs and doing so on an on-going basis. I believe that the difference is the way in which we are actually working at the people level within the team rather than the contracts. I still think the contractual arrangements are important. The distinction I am trying to make is that I do not believe that the contractual arrangements is the element that drives the behaviour.”

The author believes that both arguments are valid and they are interlinked. Provision of incentives in contractual arrangements can have a positive effect on the attitudes. Collaboration and a positive attitude may be achieved by many contractual arrangements, for example, target cost contracts, the spirit of mutual trust and co-operation that NEC is attempting to achieve, partnerships etc... However, the author believes that for the achievement of Scott's objectives, a more important element needs to be satisfied. The starting point would be a willingness and a desire from the parties to totally abandon the adversarial approach that has been a characteristic of the construction industry. Instead, the parties must share a full understanding and a belief that each desires the achievement of the objectives of the other. If that can be achieved, and the author believes that it is possible, then all the mechanisms in contracts for provision of incentives will become secondary but should still assist in producing the benefits desired. The author is aware that several organisations such as BAA, Eskom and of course, BP, are introducing the radical changes

necessary to achieve the desired shift in attitudes. On the scale of the whole of the industry, this may appear as relatively insignificant. Nevertheless, it may provide the starting point to move towards the 'critical mass' of organisations needed to establish the attitude and behaviour change which Scott believes is essential.

Meanwhile the author concludes that the main difference between alliance agreements as described and target cost contracts is that the former have fully achieved a non-adversarial climate which allowed alignment of the parties objectives.

On BP's alliance agreements, the ground risks are an exclusion i.e., they are carried totally by the employer and Model F is adopted. The principle that underpins this policy is that contractors do not take risks that they cannot control. An example of the exclusion of ground risks is the Andrew Agreement (Alliance Agreement for the development of the North Sea Andrew Oilfield). In this Agreement, if the ground risk is worse than anticipated, then the target cost is adjusted. The contractor, therefore, maintains his incentive but the employer pays more. If the risk is better than anticipated, then the target cost remains the same but the actual cost decreases with the employer and contractor sharing the reward. The interview commented on the risk allocation by stating (see interview 13, p.13/5);

“ I do not accept that alliancing is more about putting all risks on contractors. I think it is about getting a more open dialogue about risks and getting those risks allocated where they should be. I think this is a very fundamental part of the whole concept of working in an open way with contractors and suppliers.”

Despite the fact that, in this particular instance, the ground risks have been totally borne by the employer, the author is of the opinion that there is no fundamental reason why the risk cannot be treated like the majority of the other risks where the risk and reward is shared. As will be seen in Section 8.8, the Model which is partly adopted in other sectors of construction, apart from the offshore industry, is Model E, where the ground risks have been offloaded to contractors. Since, in practice, the risk is allocated at either end of the spectrum it seems logical that the risk (and reward) could also be shared.

Factors which may affect Model D prevailing beyond the parameters of private sector North Sea projects could be the culture of the English construction industry. However, despite the adversarial climate of the industry, an industry survey conducted by the author (see Appendix C, Table 6) reveals that 100% of the contractors of the research sample would consider an agreement where the risks and reward are shared in a balanced way. Interviews conducted by the author for employers and contractors (for example, see interviews 7, p.7/3) revealed the same regarding the concept of co-operative risk-sharing. One employer stated the following (see interview 6, p.6/4);

“ That contract strategy of sharing the pains and the gains has been much wanted. It is a standing item on our agenda.”

A different contractor (see interview 8, p.8/5) stated the following;

“ No problem. We have been approached in the past to try to get this moving.”

Interview data (see interview 12, p.12/8) also shows that, in the opinion of some practitioners, a reason why this scheme may not be adopted for the whole of the construction industry is the relative sizes of the projects (in terms of their costs). Comparing their projects with the North Sea projects (which cost over £300 million), the interviewee stated;

“ I think one of the things that has to be recognised is the size of the project. The Andrew field, for example, costs about £350m. That is a single contract. Our capital spend in this division is only about £250m-£260m per year on a whole host of projects. To have a contract more than £10m is fairly rare. Most of our contracts are within the £1m-£1.5m. It is not possible to have some of the long term relationships in those much smaller contracts. It is easier on the bigger North Sea Oil contracts. They have mechanisms there for the designer, the client and the contractor to have a share in savings and overruns. Ours are more simpler and straightforward because we just have the two parties, the contractor and ourselves.”

Nevertheless, this model of allocating the risk may face other pragmatic obstacles. Interview data (see interview 6, p.6/5) shows that some contractors may be wary of the scheme. It would be mainly due to the fact that almost no project in the UK is completed

within time and cost. Every major project for example, the Channel Tunnel, the British Library etc., has not met its primary objectives of cost and time. Therefore, if parties shared the pains and gains, then contractors would tend to think that they would always be in pain. Therefore, this scheme may be more acceptable to them if the projects became more successful but sadly, in this country, many projects fail to achieve their objectives.

Nevertheless, Scott believes that the history of construction projects not being completed within time and cost should not be a hindrance to the scheme being used in other sectors of the industry (see interview 13, p.13/4);

“ There is no doubt that they would come with a history of projects not being completed within their budget and duration. I would see that as a reason to do something about the way the projects are implemented because clearly the way they are done at the moment is not satisfactory. They are not satisfactory from a client’s point of view and they are not from a contractor’s point of view either. Clearly, however, the perceptions that people have about risks and so on, from everything that their experience tells them, is something that has to be dealt with. The fact of the matter is that we faced exactly the same issues when we first started talking to the industry about working in a different way. It takes perseverance, courage, leadership and an ability to lay a vision for people and above all, recognition that all their concerns are valid. They are valid concerns and we have to deal with those concerns to get people to a point where they can see that we, the client, have not come up with a new scheme which will result in us being better off and the contractor being worse off. Personally, I believe that the construction industry is probably one of the ripest industries in respect of its potential to benefit from a whole change in the way in which major projects are carried out. The Channel Tunnel is a prime example. That was a project where there was no alignment between the client and the contractors. It is a great engineering success and a mess financially.”

The author can, therefore, conclude that there are many ways to approach risk sharing. However, it would not be easy to measure the relative success of each. The comparisons need significant research which is beyond the scope of this thesis. The most important issues appear to be;

- Which is the main driver towards the success of projects, the nature of the attitudes or the contractual arrangements?

- Does the change need to be fundamentally organisational or through a series of one-off projects that prove to be successful through an attitude change?
- Is it possible to include the ground risks to the list of risks that are shared between the parties?

To the author, there seems to be a cycle where the success of projects can change the attitudes and at the same time, the attitudes can provide the success of projects. It may be that both situations are required to solve the problem. Fundamental and radical organisational changes to attitudes coupled with a series of successful one-off projects, both occurring in parallel, may shift the position of practitioners in the industry. If that occurred, then the author believes that problems posed by risks such as ground conditions will be largely solved as they be dealt with as part of a larger package of measures where collaboration and fair reward are the dominant characteristics.

8.8 MODEL E: OFFLOADING OF RISK TO THE CONTRACTOR

In this Section, the author provides an investigation of a model where more risks are carried by the contractor. In 1991, the Roads Directorate of the Scottish Office Industry Department launched its Alternative Tendering Initiative (ATI). The ATI includes, amongst other things, offloading to contractors risks which were traditionally borne by the employer, including the ground condition risk.

The literature showed that the position of the law is to place all risks with the contractor. Only with express provisions in standard forms of contract has the employer been allocated some risks, which include unforeseen ground risks. This Model, therefore, suggests a movement towards the original position of the English Law. However, not all writers agree with this policy, for example, Kuesel (113) who stated that;

“In traditional construction contracting practice, the owner allocated almost all risks to the contractor. This fostered two results:

1. Contractors added high contingencies to their bids to cover the costs of risks.
2. Litigation of construction contract claims blossomed.

Broadly, the owners lost - the courts reallocated many risks the owners thought they had laid on the contractor. Thoughtful owners and engineers recognised that owners were paying for risks twice - once in bid contingencies and a second time in court. Meanwhile, contractors were not getting rich (even if they were lucky) in court. And construction law was becoming an increasingly lucrative field for lawyers.”

Uff (93) shows the possibility of allocating risk to one party but he also warns of the importance of taking into account the consequences;

“It is a relatively straightforward matter of drafting to place the direct or immediate risk on one party. This may be achieved by an express term, but even that may be unnecessary if the law would otherwise place such liability squarely on one party. However, to transfer a risk fully, it will be necessary to

consider all the possible consequences and to make appropriate provision for them, using devices such as indemnities.”

Despite Kuesel’s (113) point of view, for some employers, cost certainty is of great importance and this is perceived to be achieved through offloading more risk to contractors. We find, for example, that McEwan (114) states;

“ The capability of the economy to sustain a programme of construction projects is dependent not only upon estimated costs of construction but also upon how much can be afforded out of the annual amount available from the budget when the expenditure comes on stream. Where under the Contract financial risk is allocated to the Employer, then to this extent the expenditure is uncertain. But if the Contractor takes on this risk and includes for it in his Tender price this uncertainty is dealt with at the Tender stage and the cost of the programme is better secured.”

Also, Innes (115) states that the principal objectives the Directorate set out to achieve were:

- “- Removing confrontation between the parties to the contract.
- Releasing the skills of the contractor at the correct stage of the project.
- Providing the contractor with incentives.
- Providing the client with greater cost certainty.”

Whilst these objectives include greater cost certainty they include others which appear similar to those sought from alliance agreements, discussed in Section 8.7. In this context it is noteworthy that the Directorate’s policy is to undertake extensive pre-tender site investigation, sometimes at the request of tenderers.

Innes also provides a list of the benefits from a design and build contract placed on a lump sum fixed price contract;

- “- the handling of the earthworks has been transformed.
- far greater attention is paid to temporary drainage.
- material is no longer worked in unsuitable conditions.

- the volume of unsuitable material taken off site and replaced with suitable has greatly reduced with operational, financial and environmental benefits. The environmental benefits, while an unexpected bonus, may well prove to be the most significant outcome.”

The concept of offloading risk to contractors has not been confined to the Scottish Office. Long (116) shows that the Highways Agency in England has also been adopting the concept on their Design and Build projects. He states;

“ Clause 13 of the contract (which is a new form of design and build contract) may entitle the Contractor to additional payment in the event that he encounters physical conditions or artificial obstructions which could not reasonably have been foreseen by an experienced designer or contractor. This gives the Agency the option to decide at tender stage who should carry this risk. Alternatively, the Agency may seek two bids, one with the clause in the contract and one without the clause.”

This appears to be a different rationale from that offered by the Directorate as the discussion whether to offload the risk seems to hinge on the price contingency included by the tenderer for carrying that risk.

However, the policy of the NEC, even when used with contractor design, is to allocate the ground risks to the employer. The reasons, extracted from discussion papers between the University of Birmingham and the Directorate, are outlined below;

i. a principle of risk allocation adopted for NEC is that risks which are outside the control of either party should be carried by the employer.

ii. it motivates the employer to do thorough site investigation whereas to allocate it to the contractor would produce the opposite effect.

iii. in the competitive tendering climate which exists, with most contracts awarded to the lowest bidder, there would be likelihood of many contracts being awarded to the contractor who had under priced the ground risks.

iv. some employers would be tempted by the apparent advantages of a low first cost based on minimum site investigation coupled with unrealistically low bids.”

This brief review of relevant literature has focused on relatively recent developments, which offer some bridges between apparently polarised positions. The author suggests that Kuesel's interpretation is sound if the issue of offloading ground risk is viewed as an isolated tactic. The approach of the Highways Agency includes a further tactic of testing the value and worth of the price contingency but does not seem to remove or address Kuesel's point about 'blossoming litigation'. The Directorate goes further through a package of measures which seek to achieve collaborative working and minimal contingencies. The latter are obtained by reducing the extent of the risk through extensive site investigation. The author assumes that this package of measures is intended to reduce or eliminate the likelihood of claims and litigation.

The NEC position, as described elsewhere in this thesis, also seeks to engender collaborative working and uses a different package of measures to minimise the likelihood of disputes. Nevertheless, the ground risk is retained by the employer. The author's analysis of the NEC data base of comments, coupled with the published views of the NEC drafters, suggests that the main reason is that, in general, employers cannot be relied upon to introduce a package of tactics to address Kuesel's points. If the attitude and behaviour of the industry were to move significantly away from that of adversarialism (as discussed in Section 8.7) then the drafters of NEC may need to reconsider their policy towards ground risk.

The interview process carried out by the author sought practitioners' views on some of these issues. On the Heathrow Express a box had to be constructed through the landfill site (see interview 4, p.4/1). The ground was largely unforeseeable even though many site investigations had been carried out. An uncontrolled chemicals tip had been placed there during the sixties, so the site may have been contaminated as a result. The proposition for the tenderers was that the contractors should bear the risk of unforeseen ground conditions (through a modification to Clause 12 of ICE 6th Edition). However, the contractor's price to take the risk was too high for the employer to accept. The contractor's price was £400,000 against an overall contract cost of £10,000,000.

The tactic adopted here is similar to that of the Highways Agency. The employer was open to the concept of offloading the ground risk and appears to have been able to place a value on the worth of price certainty, which in this case was lower than the contractor's price for carrying the risk. From later in the same interview (see interview 4, p.4/3), it appears that the 'claims consciousness' of contractors influences the setting of the value by the employer. If adversarialism in the industry decreases, and 'claims consciousness' with it, the amount employers would be willing to pay to save the management resources and time of handling a claim would also be expected to decrease. The question then is would contractors reduce their prices for carrying the risk? The rational answer is that they would be able and should be willing to do so if the risk is well defined and small, as a result of high quality site investigation. It could also be argued that, in this 'ideal world' situation, the parties become neutral as to who carries the risk.

An interview with a contractor (see interview 8, p.8/3) suggested that the Government is pursuing design and build, with the ground risk carried by the contractor, due to significant cost overruns from that risk. However, the earlier quotation by Long (116) suggests that, as with the interview reported above, the employer can place a value on what he is prepared to pay to offload the risk. The contractors' view, as expressed below, suggests that this may not be an easy task, certainly on road contracts (see interview 8, p.8/3, p.8/4);

“ The only problem then is how serious that problem is. If all ground conditions surveys are taken down the left-hand side of a motorway for 5 km and the left-hand side is OK but the right-hand side is poor ground from front to back. That would not seem to be reasonable. So, some judgement has to be made as to what could be done in the circumstances. A sliding scale could be made to cap contractor's liability. The following could be stated which may be along the lines of: “any ground conditions are the contractor's responsibility but should the costs be in excess of a certain amount X, then the client contributes 25% between one figure and the another”. In this way, the contractor's total liability will be capped. Contractors would take the risk provided there is sufficient premium there for them. The client must be wary about going for the lowest bid. A contractor may submit a bid missing a key issue and by virtually having missed that key issue, his bid is lower than everyone else. That is the only thing that I'll make sure that they are wary of. And provided that they do not necessarily jump for the lowest bid, which is what the contractors have been trying to tell them for the last 30 years that they have to view the bid in its entirety, then the

approach should not be a problem. As long as contractors know where they stand, particularly with capped liability.”

There is support in the above for Innes’s view that benefits flow from the contractor carrying the risk. However, the concept of a ‘capped liability’ does not fit easily with that of price certainty and suggests that the contractor has a mental picture of a probability curve with a small but real chance of an extremely adverse set of ground conditions. The contractor is, in effect, arguing that these cannot or should not be priced into a contingency at tender stage. If this is the case the employer is unlikely to be better able to price them. It is also possible that the employer may not wish to consider the extreme problem when setting a value on what he is prepared to pay for offloading the risk.

In addition, employers who seek offloading more risks to contractors, the market conditions may also make that choice easier (see interview 4, p. 4/3). The interviewee stated;

“ Market conditions can govern the choice of whether the contractor should or should not carry the risk of ground conditions. But that way, contractors would be taken advantage of, if the market conditions are not in their favour. Recession along with competitive tendering would put the contractor without a profit.”

Therefore we find that, despite the principles adopted by NEC for allocating part of the risk to employers, Model E may be used quite widely in different sectors of the industry. The extent of its use over the industry is mainly dependent on the attitude of employers, rather than contractors. The findings of the research also suggest that, in some cases, contractors may be willing to bear additional risks and in other cases, they may not but may be forced to do so by market conditions and competitiveness. It is a fact that offloading ground risks produced benefits for employers in at least one case (the set of projects adopting ATI). However, this may not apply in all circumstances. The benefits appear to have been achieved only when done in a highly controlled way and within a package of measures designed to promote collaboration. The findings of the research also suggest that the Model may not always be beneficial to employers. Their objectives may not be met and at the same time, the risk may be over-priced by contractors. Unless the risk itself can be

shrunk through high quality site investigations, the risk of the extreme problem remains and is likely to be intolerable for contractors in the long run.

8.9 SUMMARY AND CONCLUSIONS

The findings of the research in this area can be summarised as follows;

- The ground risk is a major problem in engineering and construction projects. More often than not, parties suffer by the loss of time and money in handling unforeseen ground conditions.
- The problems due to ground risks are two fold. Firstly, there are the costs and delay that may occur to a project due to the modification of the methods of construction if the ground is worse than expected. Secondly, there are the additional costs and delay that may arise if it is not clear who will bear the costs and delay which fall in the first category. 85% of the contractors of the research sample have suffered increase in costs and delays within their projects during the last ten years due to disputes which have been the result of unforeseen ground conditions.
- Reliance on site investigations does not solve the problem of unforeseen ground conditions. If the site investigation is to be economical, then it can never eliminate the possibility of unforeseen ground conditions.
- Model A for allocating the risk has been considered by many to be a contractual disaster. It does not serve the objective of eliminating the additional costs and delay that fall in the second category. In reality, it serves to increase these costs.
- Model B clarifies to a better extent the foreseeability of the events by stating the words “*has such a small chance of occurring*” but the words still remain subjective even though the chances of misinterpretation and ambiguity may be reduced.

- Model C would provide a clear allocation of the risk but it is still in need of further research and future development before it can be adopted in practice.
- The 'alliance agreements' which are the basis for Model D, are based on a fundamental shift in the nature of the relationship between clients and contractors. The concept of co-operative risk sharing within the 'alliance agreements' may provide a solution that may eliminate the costs that are incurred in dispute resolution processes when a ground risk occurs. The contract strategy of the agreement is similar to a normal target cost contract. The main difference appears, not within the contract strategy itself, but within the attitude of the contributors to the project.
- Model E attracts opposing opinions from practitioners, each with their own set of reasons. Broadly, practitioners who oppose the Model have their set of reasons based on the principles of risk allocation. Other practitioners base their set of reasons on results achieved upon adopting the Model. However, the Model may not always be beneficial to employers. Their objectives may not be met and at the same time, the risk may be over-priced by contractors. For contractors, unless the risk itself can be shrunk through high quality site investigations, the risk of the extreme ground problem remains and is likely to be intolerable for them in the long run.

The findings above for the review of the different models for the allocation of risk suggest that there is no single ultimate solution that will be viable for all engineering and construction projects. Each model presents its own set of benefits and disbenefits for both employers and contractors.

Model A has failed to solve the problem over many years and may have contributed to the increase in claims, adversarialism and litigation. It is therefore timely to give serious consideration to alternatives and to make a rational assessment of them, avoiding prejudices.

Although the history of projects in the UK suggests that they do not meet their primary objectives, this may be gradually changing by the introduction of documents such as the NEC, for which a primary objective was the stimulus of good project management and another was the promotion of mutual co-operation and trust. Another factor is the Latham Report (117), which is provoking a change in the adversarial culture of the construction industry in the UK.

Models B, C, D, and E have been presented as separate options but some common issues have emerged, for example, collaboration, the importance of defining the risk boundary, and how the risk is priced. Amongst these models, the author suggests that the model that may most successfully eliminate the arbitration and litigation costs and delay that almost always presented themselves in projects in the past, is Model D. It is the main model that addresses the essential issues of collaboration, non-adversarialism and the spirit of co-operation and mutual trust. The Model can be adopted for many risks that pose a problem of unclear boundary of allocation between the parties to contracts, including the risk of ground conditions.

8.10 RECOMMENDATIONS FOR FUTURE WORK

Further work is needed in this area to develop the probability distribution curve as a means of defining more clearly the boundaries of the risk. However, and perhaps more importantly, the research has revealed considerable experimentation in the industry in relation to the allocation of the ground risk (and other risks such as the co-ordination of the work of utilities and the security risk of dealing with protestors which have not been the subject of this thesis). A rational assessment of these initiatives is needed.

CHAPTER NINE: CONCLUSIONS AND FUTURE WORK

9.1 CONCLUSIONS

The research described in this thesis has covered several different areas all related to a common theme of risk allocation. All the risks considered may be embraced by the umbrella of the contractor's responsibilities and liabilities under a contract. A summary of the risk areas covered is shown in Figure 16 below;

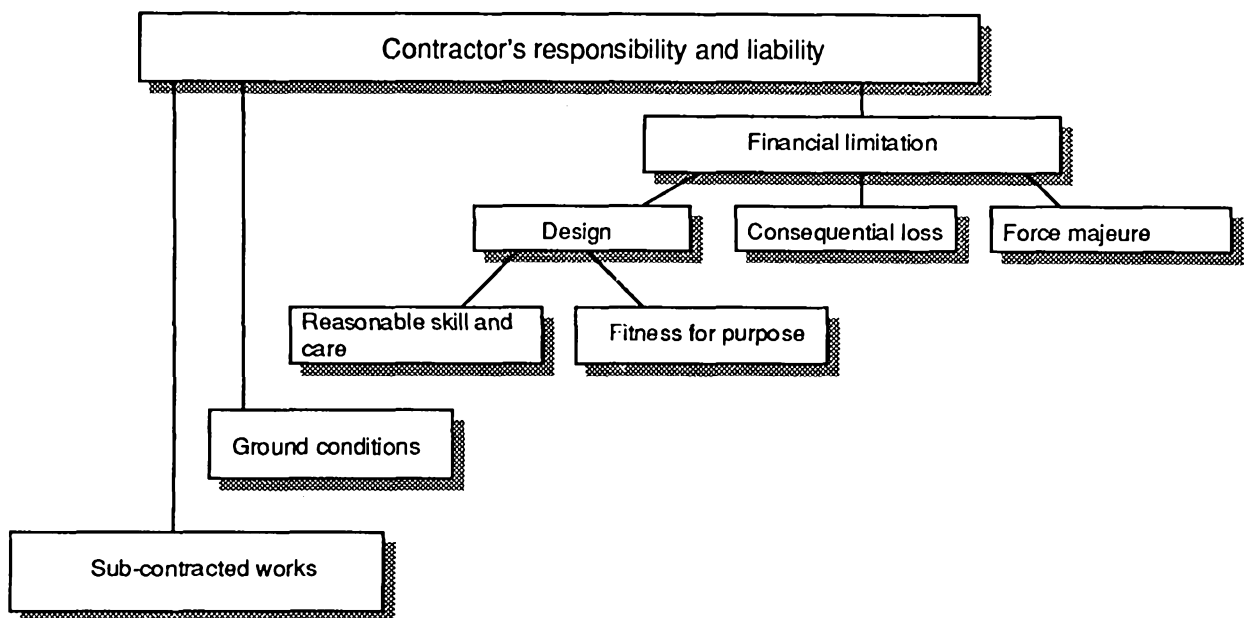


Figure 16: Responsibilities and Liabilities Researched

For all of the risks shown, the author has investigated their allocation, insurability and the liabilities for them. The research has identified many problems associated with risk allocation. For some risks, the research has investigated the extent of the problems and sought to provide a deeper understanding. For other risks, the author has identified alternative models of risk allocation and made proposals for the adoption of certain models which should help to alleviate the problems in the particular risk area.

In Chapter Three, concerning design liability of contractors, the author has established that Case Law, for both contract and tort, does not provide a clear statement that defines 'fitness for purpose'. He also demonstrated that the distinction between the two levels of liability, 'fitness for purpose' and 'reasonable skill and care' is not explicit. In that area, the author has also established that the model adopted by the NEC for limiting the contractor's liability for design is the most appropriate for the requirements of the construction industry in the UK.

In Chapter Four the author has shown the degree of unavailability of insurance from the commercial insurance market for the strict 'fitness for purpose' liability. The author has also established that if 'fitness for purpose' liability is imposed on contractors, then they may be able to adopt a model which insures that liability through one of the means of self-insurance.

In Chapter Five the author established that the absence of a limit in the NEC to the overall financial liability of contractors may limit its attractiveness to certain sectors of engineering construction. Other forms of contract which contain such a limit are not consistent in the way in which liability is limited. A framework for a model suitable for the NEC is proposed.

In Chapter Five the author also identified a variety of definitions and methods of treatment of 'force majeure' events. He also showed that there are many factors which combine to make 'force majeure' events contribute to the adversarial climate in the industry. The need for a precise definition of these risk events was demonstrated, although the usage of the term 'force majeure' may not be necessary as it has no precise meaning in law nor a commonly accepted definition within the construction and insurance industries. An adequate procedure is needed for dealing with these events if they occur and it should take into account their insurability. The author has provided a framework for such a procedure.

In Chapter Six, concerning 'consequential losses', the author has demonstrated the importance of the clarification of these types of losses in contracts. He also provided a suggestion on the type of model to be used to achieve this aim. He recommended that specific types of losses should be outlined in forms of contract (without the use of the term 'consequential losses') with a limitation of liability to the contractor for them.

In Chapter Seven, concerning insurance of subcontracted works, the author has shown that the choice of Model seems to be independent of the Subcontract Form and the type of works undertaken. He has also shown the general preference of the industry contractors which is Model A where they insure the whole of the works as well as requiring their subcontractors to insure their parts of the works. He has also shown that he has been unable to establish a valid reason for the unpopularity of Model B (contractor only insurance).

In Chapter Eight, concerning the ground risk allocation, the author has shown that there may not be a single ultimate solution that will be viable for all engineering and construction projects. Each model presents its own set of benefits and disbenefits. Nevertheless, the author suggests that the Model that may most successfully eliminate the arbitration and litigation costs and delays that almost always presented themselves in the past is the risk-sharing Model.

At the outset of the research, the perspective was held that many of the issues and problems of risk allocation lay at the interface of management, legal and commercial practice and in that sense they shared common ground. This has been justified by the research but the degree of difficulty it would cause to conducting the research was perhaps underestimated. It has been found that many practitioners have specialised knowledge and understanding in one and sometimes two of the areas but not in all three. This required more cross-investigation between the areas of practice than was anticipated. However, this aspect of the research has provided enlightenment on the need for a deeper understanding on the interaction and interlinkages between these different areas of practice.

The author also concludes from these observations of practice and the difficulties at the interfaces of specialists that a source of conflict and disputes in contracts is the lack of a shared understanding between practitioners with different specialisations. Many practitioners demonstrate a high level of competence within their own area but are not able to reach fully informed judgements on how their policies and decisions impinge on other areas of practice. Whilst this research has not provided solutions in all the areas researched, many of which are of considerable technical complexity, the author hopes he has provided a clearer map of the terrain of each area of risk. He also hopes that he has provided a framework upon which further research can build with the ultimate aim of achieving win-win solutions for all the parties concerned.

Another aspect of the problem is the nature of the adversarial climate in the construction industry in the UK. The underlying hypothesis for this research was that within the construction industry some risks are allocated in a way which may not optimise the benefits to the parties involved. As seen throughout the thesis, the author has established that, in some areas, this hypothesis is valid.

The main conclusion for this research is that there are still many problems that exist in the administration of contracts for engineering and construction projects in the UK industry. Nevertheless, the author believes that many of these problems can be overcome. In some areas, there is still more research to be conducted before robust solutions can be offered. The common problem is seen as the adversarial approach for construction contracts. The attitude of the industry has still a long way to go for the changes desired to be achieved. However, the author views the NEC and the principles that it stands for as a step in the direction of changing that attitude towards a non-adversarial one.

9.2 RECOMMENDATIONS FOR FUTURE WORK

Concerning liability insurance, the research has been focused mainly on contractors. The problem for subcontractors, professional designers and architects has been established. However, the research did not reveal the extent of the problem for them and the means of overcoming such problems that do exist.

Another area which has not been covered by the author is the limits of indemnity that insurers are prepared to specify in the exceptional circumstances when they insure 'fitness for purpose'.

The author suggested a model for limiting the contractor's financial liability in NEC. Further work should research the effect of this model on contractors in the construction industry who undertake civil and building works and who are not used to overall financial limitation.

Concerning 'force majeure' risk events, further work can investigate the extent of availability of insurance, as it may be dependent on the insurance market cycle. It might also investigate whether the alleged dependency on the insurance market cycle actually exists.

In relation to 'consequential losses', the author has shown that the types of losses outlined by the insurance market may still be too wide in scope. The author has shown that the types of losses can be any derivatives of loss of production. Further work needs to be done, for example, on maximum periods of indemnity for these losses. The author has also shown that the legal definition of 'consequential loss' may be too wide in scope. Further work may be undertaken to try to define boundaries to this definition. It appears that the legal interpretations of direct loss draw in 'losses' which are regarded as 'consequential' in most commercial areas. However, there appears to be no legal attempt to draw a boundary nor to consider the extreme limits of 'consequential loss'.

Concerning insurance of subcontracted works, future work can research the success of adopting Model B (contractor only insurance) and whether there were cases where this Model produced the negative effects that promoters of Model A are suggesting.

Finally, in relation to ground risk allocation, further research is needed to develop the probability distribution curve as a means of defining more clearly the boundaries of the risk. However, and perhaps more importantly, the research has revealed considerable experimentation in the industry in relation to the allocation of the ground risk (and other risks such as the co-ordination of the work of utilities and the security risk of dealing with protestors which have not been the subject of this thesis). A rational assessment of these initiatives is urgently needed.

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