

## **Chapter 3                      Questionnaire on Risk Management**

### **3.1 Introduction: The Need for a Risk Management Questionnaire**

Risks are ever present and depending upon the uncertainties and their potential consequences, we routinely accept them and take measures to minimise them. We appreciate the risks in driving a car and ensure that a motor insurance policy provides ‘cover’ in case of an accident. The extension of this to the management of the risks within the construction industry, and the oil and gas industries is not as straightforward. Construction work is often hazardous, particularly with projects currently being large and complex. This, coupled with increased technological advances and a more competitive financial environment, leads to a greater dependence on risk analyses determining the outcome of a project (Chapman and Cooper, 1989). Further, the consequences of an accident can be significantly greater, such as in the Piper Alpha disaster in the North Sea (Cullen, 1990).

While these analyses have been routinely carried out, the importance of the analyses have never been greater. They are conducted at all stages of a project life cycle, from feasibility to decommissioning (Buchan, 1994). Despite a growing element of major projects in being, however, there is no standard to which reference may be made for techniques, factors and approaches to risk analysis. It was this lack of information that led to the questionnaire survey described in this thesis.

Risk, risk assessment and the control of risk have become fundamental to the success of a major project. The variations in the use of such risks analyses are considerable and are dependent on numerous factors such as the industry sector, the size of project, and stage of the project life cycle. These variations and factors have been investigated via a questionnaire and is an element of an on-going research into the application of risk management in major projects. The questionnaire entitled ‘Questionnaire on Risk Analysis’ (see Appendix A, and hereafter abbreviated to RMQ, see section 1.5) was circulated to both the oil and gas and construction

industries. The results from this questionnaire are important to both industries, as they could suggest significant improvements on company's policy toward risk management and could introduce new techniques to assess risk. Also, the options for responding to risk could be increased and/or applied to different scenarios. The starting point for the investigation was an examination of both published and unpublished information on the use of risk management used in the two industries. This search found that the oil industry has been meticulous in its risk management, which is not surprising for an industry operating in a harsh and hazardous physical environment (Chapman, 1992). What was surprising was the absence of an industry norm, although some companies had internal manuals for risk analyses. Despite its relatively poor health and safety record (HSE, 1988a), the management of risk within the construction industry was not widespread and seemed to be limited to companies involved in 'major projects'. Akintoye and MacLeod (1997) studied 100 top contractor and project management firms for their questionnaire survey on risk management practices in the construction industry. Their survey covered a spectrum of small, medium and large firms, with the outcome being that 67% and 77% of the contractors and project management firms, respectively, did not have any formal risk management training or techniques. These percentages, however, emanated more from the small and medium sized firms. These considerations subsequently influenced the choice of the sample and the design of the questionnaire. Only large firms were considered, who were continually involved in major projects, thus the applicability for these formal techniques were more pertinent.

### **3.2 Design of the Questionnaire**

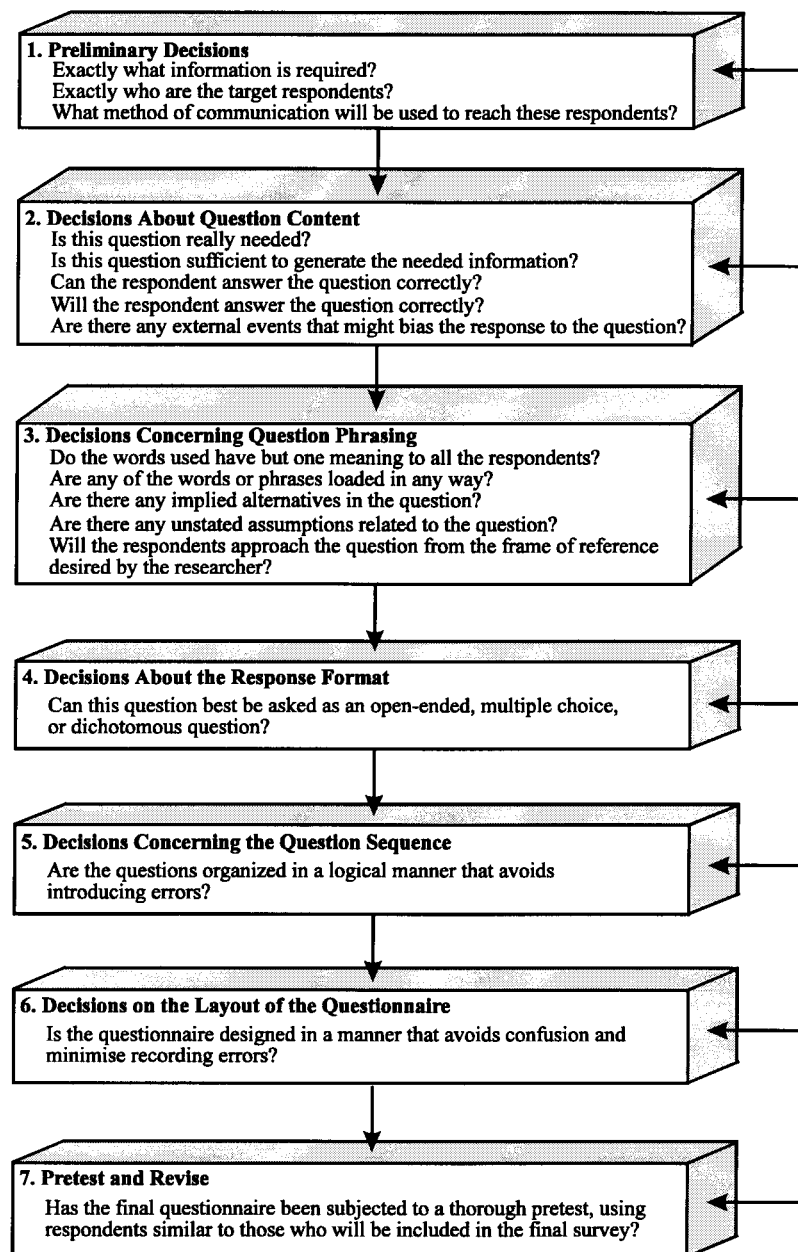
Tull and Hawkins (1990) were referred to frequently, as well as utilising colleagues' experiences, in the general design of the questionnaire. This followed the seven important decisions illustrated in Figure 3.1. Basically, because there is little standardisation of the risk management process, it was necessary to design a questionnaire in order to ascertain information on the current trends used in today's risk environment. The target respondents were employees from the fields of finance,

insurance, safety, design, exploration, installation or operations, who had been implicitly involved in a major project where risk management was used. The questions themselves were then devised carefully, drawing upon a combination of the author's experience and texts on the matter. The author's experience included extensive discussions with many risk analysts within a major construction company and a principal oil company. The texts used in the derivation of many parts of the questionnaire were Carter and Doherty (1974) in particular, as well as Raftery (1994), Flanagan and Norman (1993), Singleton and Hovden (1994) and Thompson and Perry (1992). Many versions of the questionnaire were piloted out to a number of industrial personnel from the construction industry and experts in the field of oil exploration, before the final version was dispatched.

The questions were designed so as to abide by decisions 2 and 3 in Figure 3.1. The style in which the questions were answered, i.e. how they should be answered by the respondents, was a major point of debate as is always the case in designing questionnaires. One of the objectives of the questionnaire was for it to be quick and easy to complete. This was crucial, as there were many questions, because the field of risk management is so broad. Therefore, the objective was to keep the respondents answering these questions quickly, but efficiently. The answering techniques which were chosen are defined here and fully explained in section 3.5. The questionnaire utilised many simple yes/no questions or five numbered ranking scales. A few open-ended questions were also posed, but were kept to a minimum and were as much as possible designed out by re-phrasing the original questions.

The question sequence was carefully considered to lead the respondents to continue with the questionnaire to the end, with the obvious objective to maintain interest whilst completing it. This depended heavily on the layout of the questionnaire. Firstly, it was imperative that the presentation of it was neat and attractive, so that the respondent would look forward to turning to the next page. It also depended on the question and section order. The questions at the start of the questionnaire were introductory questions to assist the respondent to attain a 'feel' for the answering

style and to become relaxed with a few simple questions. The sections were then ordered, so that the more taxing questions were in the sections later on in the



extracted from Tull and Hawkins (1990)

**Figure 3.1** *Questionnaire construction decisions*

questionnaire. These questions may have required additional information to be obtained before an accurate answer was supplied. This resulted in the section order not following the order that a normal risk management would pursue, namely risk

identification, estimation, evaluation, response and monitoring. This, however, was not found to be a problem as the entire questionnaire was completed by all those respondents that replied. The layout and question sequence, and even the questions themselves, of the posted, or final, version of the questionnaire were then subjected to many changes, as mentioned above, before it was sent out for completion.

### **3.3 Methodology of the Questionnaire**

The overall objective of the investigation was to ascertain the details of risk management practices carried out by the oil and gas industry, and to compare it with the adopted procedures within the construction industry. The questionnaire was biased specifically towards major projects. Therefore, it was necessary to involve the largest companies within the two sectors as they would possess the more, or most, advanced risk management practices. Because of the relatively small number of oil and gas related companies operating within the UK, all 27 were selected for survey. While there are over 8000 companies involved in construction, only the 100 largest construction companies were identified for survey as they were most likely to be involved in 'major projects'. Thus a total of 127 companies were circulated. These were initially contacted concerning their interest in the RMQ.

According to information on completed surveys provided by colleagues and published good survey practice (Tull and Hawkins, 1990), the work programme for this questionnaire was as follows:

1. To identify **a)** the largest 100 construction companies in the U.K. (Jordans, 1992/93) and **b)** the oil companies presently operating in Britain (M-G Information Services Ltd., 1994/95). Although, the construction industry information was 2 years out of date, more recent updated information was available from Jordans upon request. This updated material service was utilised and included into the selection process. There were two criteria for selection, which were the number of employees the company possessed, and the turn-over

per year. Other considered criteria were sales, net tangible assets, pre-tax profit, post-tax profit, fixed assets, current assets, average remuneration per employee or stock and work in progress, but the above 2 were favoured over the others. This was because the larger these 2 were, the greater chance that those companies were involved in major projects.

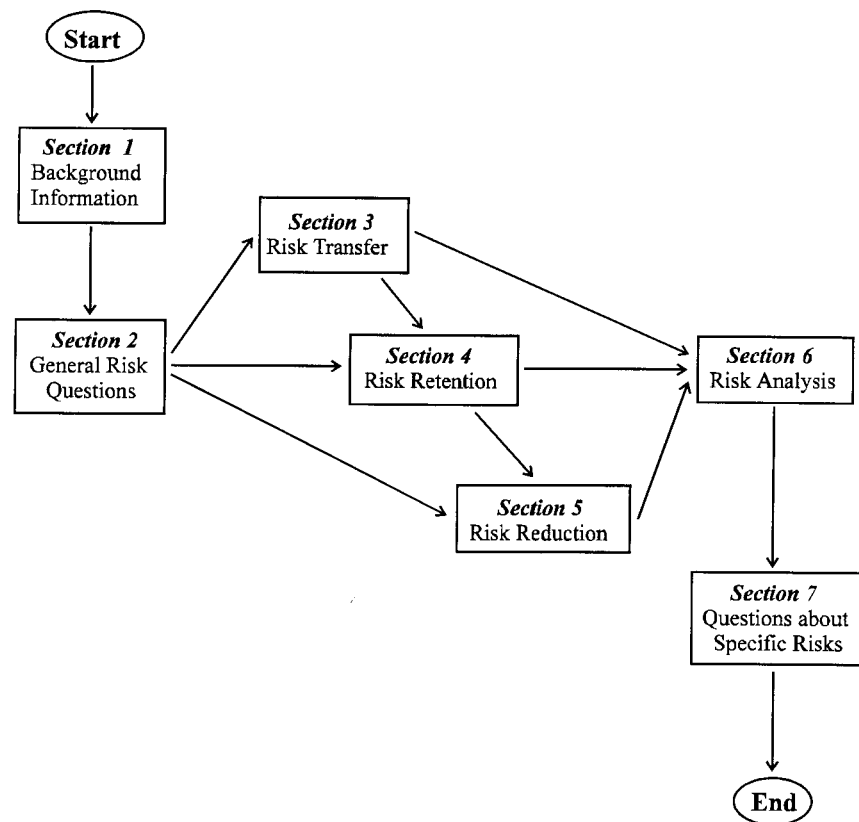
2. Verbal communication was made as well as sending an introductory letter (see Appendix B1 and B2) to the Managing Directors of each of these companies, in order for them to identify the candidates most pertinent to risk management, the objective being to send 6 copies to each company. The 6 participants could be in the areas of finance, insurance, safety, design, exploration, installation or operations, as well as obtaining a member at the highest level of management to respond. The reason for this was to attain a clear overall picture of any particular company from 6 different perspectives. Also, certain questions were quite specialised, so only specific employees could answer them.
3. If the company had agreed to participate, then all of the Managing Directors were contacted to obtain the names of the respondents. Then each of the respective respondents were telephoned to ascertain whether they would like to be involved.
4. Then, once the final version of the questionnaire had been produced, the questionnaires were posted to the relevant people and their responses awaited.

750 copies of the questionnaire were produced. The final return date was 23 June 1995. Those participants who requested the results would then have been informed of the summary.

### **3.4 Format of the Questionnaire**

The questionnaire was designed to elicit information on how risks were analysed, evaluated and finally controlled (McKim, 1992). The questionnaire consisted of 58 questions which were divided into 7 sections. The format of the questionnaire is illustrated, in the form of a flow diagram, in Figure 3.2. Figure 3.2 is a framework that shows the sequence, or the path that each respondent should have pursued in

order to fulfil the requirements of the questionnaire. The order of the sections was not in the sequence of a typical risk analysis, which was a conscious decision. It was designed so that the questions which required more time and information were placed later in the questionnaire, so as not to ‘put off’ the respondent mid-way through the questionnaire, which could have threatened the completion of the remainder of the questionnaire. This particular design concept worked as all the respondents that did reply, completed it as best they could.



**Figure 3.2** *Framework of the questionnaire*

### 3.5 Answering Techniques

To reinforce section 3.2, the answering techniques that were utilised for the RMQ are explained further here. Three techniques for answering the questions contained within this questionnaire were used. The five scale ranking technique was the most favoured and was used extensively. This method offered the respondent a number between 1 and 5, where 1 and 5 were the contrasting extremes of a possible answer

(e.g. 1 = very satisfactory and 5 = not satisfactory and numbers 2, 3 and 4 were a sliding scale in between). It becomes apparent that the definitions of the ranking systems can vary from one question to the next; although most of the questions were worded and organised so that a number of ranking system questions could have been *grouped*. All that was needed was a cross, circle, slash through the number most pertinent to the respondents' situation. When analysing the completed questionnaires, the marked numbers were simply inputted as they were ready to be statistically reviewed.

The second technique was a box method. Most frequently, this meant a simple yes/no question with a box denoting 'yes' and another for 'no'. Other questions gave choices of boxes with their own specific meaning, and the respondent was required to tick the relevant box. In the analysis of these questions, numbers were assigned to each box for ease of statistical analysis. Once the analysis of the questionnaire commences, see Chapter 4, the meanings of the ranking systems, numbers for the boxes etc. for the two types of question/answering techniques are clearly stated at the outset of each section, or sub-section. The ranking systems and numbers, allocated for the boxes, are such that the averaged positive replies, or favourable facts about a company (e.g. very competent, very satisfactory etc.), are at the lower end of the scale, or nearer 1; and the negative responses (e.g. not satisfactory, no provision etc.) are at the other end, which was 5 for ranking systems and usually 3 for box questions.

The third and final type of question/answering technique was the open-ended method. Open-ended questions are time consuming and as such were kept to a minimum. The author attempted to identify the possible replies to the questions, to eliminate open-ended questions, so as to keep the questionnaire short. The other problem with open-ended questions is that the replies are very difficult to group together. Grouping allows common information to be obtained and assists in the statistical analysis. However, spaces were given at the end of each section and to the questions where expansion was desirable. This gave the respondents the opportunity



to write more about a point if they felt any additions were necessary, or helpful. The comments that proved to be interesting and useful are highlighted in the analysis of the questions.

The issue of non-response is a crucial one when one undertakes a questionnaire survey, and is discussed with reference to the above answering styles in the following section, 3.6.

### **3.6 Non-Response Replies**

The non-response topic needs serious attention as there must be a strict format to how a non-response should be dealt with. The system of a non-response, throughout the questionnaire, shall follow the explanation given below, unless specifically described otherwise. The modified scenario is outlined at the outset of the section containing the question, or questions, under the new non-response system.

Firstly, on the inside cover of the questionnaire there is a *'very important note'*, which explains that if the candidate, or respondent, did not possess sufficient information to give an accurate enough answer, then that candidate had to put a double question mark against the problem question, like '??', and then leave the question blank. In this situation no rank, grade, number etc. was placed against that question for that respondent, and thus the statistics for attaining the means, standard deviations, etc. were not affected by this omission. The sample size for that question decreased, but by not applying any assumed rank to that question, there is no bias in the resulting values.

The problem starts arising when no answer had been given and no double question mark had been inscribed. This was where a number of different arguments could be put forward with none of them having the right answer. This is because the system that is chosen is purely subjective and depending on how each individual views the situation, then determines which system to select. The explanation of the system for

non-responses used for the RMQ is now defined and applies to both the 5 scale ranking and the box answering techniques.

If a respondent had left a question unanswered and there was only one part to the question (for example question 7 in the questionnaire (see Appendix A)) or it was a multi-part question and none of the parts had been allocated grades (e.g. question 13) and no double question mark was written against it, then the resulting grade that was allotted was a blank, and thus did not alter the statistics to that question in any way. The assumption for this was that the candidate simply did not know the answer and had forgotten to write a double question mark against it, and it was not possible, or ethical, for the author, or anyone else, to apportion a rank on the respondents' behalf, as this would bias the analysis. Obviously, for any of these questions, if the respondent had put a double question mark against a question or part of a question, then this respondent's reply went into the 'Don't know' category. These replies are mentioned, if relevant, in the analysis of the questionnaire in Chapter 4.

If, however, the respondent had given no grade to one part of a multi-part question (say for example questions 35 (box technique) or 14 (five scale ranking method) of the questionnaire (see Appendix A)) and had not written a double question mark beside that part, *but* had apportioned ranks to the other parts of the same question, then the highest rank was assumed, i.e. a rank 5 in the case of question 14 or an indifferent in the case of question 35. The explanation for this was that if the respondent had allocated ranks for the other parts in the question and not to one, then it was assumed that he/she did not use that part, or find it successful or whatever, because otherwise they would have circled a rank to suggest that that part was used, or successful etc. The above argument does not apply to the 'other' parts, which are attached at the end of most questions, as they depend upon whether the candidate thinks there is another method or characteristic etc. In any case, the ranks to the other parts, when supplied with a reply, are mostly ignored as the sample sizes for those replies are too small. Instead, the responses given in those cases are just mentioned. Finally, although obvious, any non-responses given to the very few open-ended

questions were left as a blank, as it was impossible to determine any potential answers, as these questions are entirely subjective. Any other situation regarding non-responses which are possible did not occur in the completed questionnaires; therefore, this system described above is the designated system for RMQ.

### **3.7 Summary of the Replies**

Having contacted each one of the 127 largest companies, 107 expressed an immediate interest. The remaining 20 were either:

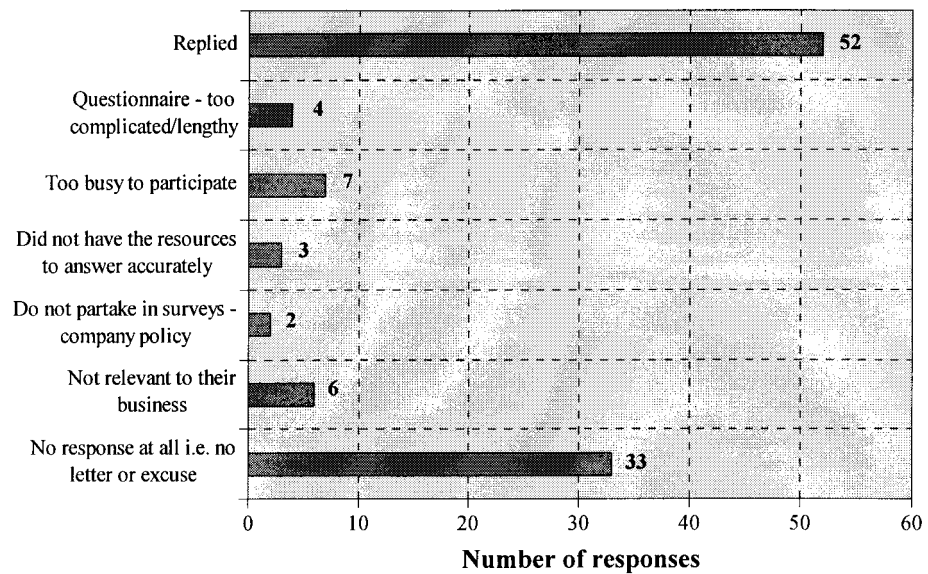
- not big enough companies to use any form of risk analysis
- had a policy of not taking part in any sort of surveys/questionnaires;
- not contactable; or
- did not have the staff available at that time or in the foreseeable future to complete such a specific questionnaire.

Of those 107, 27 of those were oil companies and the remaining 80 were construction. Six copies were sent to each of these companies. Therefore, 642 copies were used in all for this survey. A total of one hundred and thirty nine (139) completed copies were posted back, which results in a 21.65% response rate. This response rate was considered high, particularly as the questionnaire was extensive, and was assumed to take around 30 to 40 minutes to complete. Although, only 21.65% of the entire 'numbers' of copies were recovered, there were replies from 52 companies. This transpires to mean that of the companies that questionnaires were sent to, nearly 50% (exact value is 48.60%) responded with completed versions, which is regarded by any survey to be a success. The breakdown of those numbers is shown in Table 3.1.

Industry	No. of Companies who showed initial interest	No. of companies who replied	Percentage of responses (%)	Actual no. of completed questionnaires
Construction	80	40	50	93
Oil	27	12	44.40	46
<b>Total</b>	107	52	48.60	139

**Table 3.1** Breakdown of responses

Certain companies expressed their apologies for being unable to respond to the questionnaire, whilst others did not. The fact that the length of the questionnaire may have been a stumbling block is further illustrated in Figure 3.3 where the 55 non-completions are shown. Thirty three companies did not reply at all, i.e. there was no excuse or letter of explanation. The remaining reasons for not participating are displayed in Figure 3.3.



**Figure 3.3** The spread of the company's reaction to the RMQ.

Having discussed the rationale for the questionnaire, as well as deliberating its design and format, the results emanating from the most popular and successful approaches, which satisfy Figure 2.1, now require identifying. This process commences with attaining some background information on the respondents first and foremost.