Chapter Four – Research Methodology and Results

4.1 General

This chapter begins with a section to recapture the aims, objectives and hypothesis including the literature survey, initial interviews and preparation of the questionnaire. The subsequent sections are to present the results of the survey and to carry an analysis on each statement in the questionnaire .

The aims of this research are as follows:

1. To analysis the present construction safety management in Hong Kong;

2. To investigate the effectiveness of CDM regulations in the UK;

3. To enumerate the characteristics of CDM and compare these with the current safety management systems in Hong Kong;

4. To determine the preconditions for success of CDM in Hong Kong; and

5. To make proposals for the possible future action to introduce the Construction (Design and Management) Regulation to Hong Kong;

The objectives of this study are as follows:

1. To survey the present safety system adopted by Works Bureau in civil engineering projects;

2. To reveal the concept and principle of Construction Design and Management Regulation by Hong Kong civil engineers;

3. To find the constraints about implementation of Construction Design and Management Regulation;

The hypothesis was that Construction (Design and Management) regulations might be accepted by the civil engineers in Hong Kong as a statutory process to improve construction health and safety.

4.2 Methodology

The study method were divided into two stages as follows:

4.2.1 Stage One: Literature Review and Pilot Study

The stage of review on current situation would be concentrated to look at the present safety management system of Works Bureau. The review on the CDM regulation was based on reports and research papers from the United Kingdom. The literature review was a continue process through out the research period. After the initial literature review a pilot study with interview of two Works department's safety advisors, two engineers from consulting engineering firm, and two contractors representatives were carried out. During the interview, a preliminary questionnaire was used in order to validate the appropriateness of the main study questionnaire.

4.2.2. Stage 2: the main study

After summarized all the interviewee opinion, a main study questionnaire was consolidated and distributed engineers who were working with clients, designers and contractors. A sample of the main study questionnaire was attached in **Appendix A3**. After gathered the response, analysis on the results could be carried out to conclude this study and made recommendations.

4.3 Results and Analysis

Out of 200 questionnaires distributed, 42 filled up questionnaires (20% response) were returned to the author by hand. This could mean that most of the respondents had personal knowledge of the author, and thus to concur with most of the author view in the subject matter. All the respondents had at least the first degree in Civil Engineering, and only 5 percentage of respondents also had the safety qualification (such as the membership of Institution of Occupational and Health or enlisted in Registered Safety Officer Register). In average, the respondents have over 10 years of experience and over 95 percent of respondents had professional qualification. Only 5 percent of respondents knew about the CDM regulations.

With such small proportion of engineers had safety qualifications and knew about CDM regulation, the results of this study would represent a general view of the civil engineers on CDM regulation. Discussion of the results were as follows:

1. Who are you working for?

From the responded questionnaires, the number of responded engineers were quite evenly distributed among clients, consulting firms and contractors and the distribution ratio were 16:14:12 respectively. From the author's initial interviews with safety advisers, they agreed that there were no professional status of safety personal in Hong Kong and the status of safety officer was regarded as another technician on site.

2. The Works Bureau should further improve its Safety Management system on a continuous development basis.

There are 100 percent agreed with this statement. In fact, the construction of this question was to tie in with the British Standard 8800 requirements and to test the respondents' thinking regarding the continually improvement for health and safety. From above result, all the respondents were in favor of continually improvement concept. In fact, Works Bureau had not updated its safety policy since 1993.

3. Presently, there are shortages of resource devoted to civil engineering construction safety.

There are 85 percent agreed and 15 percent disagreed with this statement. The construction of this statement was to gather the opinion whether the respondents would agree on additional resource should be devoted to improve construction safety. This statement was also designed to point out the defect of the Works Bureau's safety management system. With such a high percentage of agreement, additional resource should be devoted to construction safety.

4. Presently, there are communication problems among developer, designer, safety professional and contractor regarding construction safety

There were 76 percent agreed and 14 percent disagreed with this statement. The construction of this statement was to seek respondents' view whether they would consider that there were communication problems among project parties that could be removed to improve safety. As in CDM regulations, one of the primary aims was to improve co-ordination and communication among project parties. From the result, it also implied that there were co-ordination and communication problems under the present Works Bureau Safety Management System.

5.The developer should also share part of the safety obligation for construction project.

There were 95 percent agreed and 5 percent disagreed with this statement. This statement is to test whether engineers working for clients would advise client to bear part of safety responsibilities, as it was one of the major requirements with the CDM regulation. All the respondents agree the client shall bear part of the safety responsibility.

6. The client should appoint a safety planning supervisor at the project planning stage to look after the occupational health and safety aspect of the entire construction project until operation stage

There were 100 percent agreed with this statement. This statement was to obtain the view whether engineers would accept creation of a new professional' planning supervisor' to administrate safety in construction project. The results indicated that most of the respondents accepted the CDM concept with appointment of planning supervisor starting from the planning stage of the project.

7. Safety planning supervisor should develop a safety plan at the pre-tender stage for the tenderers reference

There were 93 percent agreed and 7 percent disagreed with this statement. This statement was to seek view on the CDM requirements to develop a pre-tender safety plan to highlight the foreseen or contemplate hazard at the construction stage. During the interview, three interviewees had pointed out that the safety plan should not form part of the contract document otherwise it would lead future claim from contractors under the clause of unforeseen conditions. In actual practical, hazards arose in addition to the pre-tender safety plan; then it would involve additional payment to contractor.

The arguments, regarding claim for additional payment because of the pre-

tender safety plan, was also put forward to the contract advisors of the Highways and Civil Engineering Department. They gave a common that a clause could be inserted into the contract to require the tenderers to determine additional hazards on top of the pre-tender safety plan. Under the same principle, an additional requirement can also be inserted into the tender to request the contractors have to carry out risk analysis to determine all the unforeseen safety risk and put in an contingency sum in the tender to cover for these unforeseen safety risk.

On the other hand, it would be feasible to tender out the items for safety precaution and measures on a re-measurement contract basis. Authorization to carry out these works should come from the engineer's representatives with endorsement from the planning supervisor.

8. The safety planning supervisor shall be the power to vet the method of construction at the tender stage

There were 93 percent agreed and 7 percent disagreed with this statement. This question was to verify the CDM concept whether the planning supervisor should endorse the design. Traditionally, the design was only subject to change because it did not meet the client or the statutory requirements. By introducing an additional party to vet the design, it could lead to serious objection from the designers who were always the engineers in the civil engineering field.

9. The safety planning supervisor shall be registered professional engineer or other professional in a relevance discipline

There were 90 percent agreed and 10 percent disagreed with this statement. This statement was to gather views regarding the qualification of the planning supervisor. In fact, the CDM regulation did not specify any qualification for competent person to become planning supervisor. The result indicated that

planning supervisor should have a minimum standard of qualification should be set up with professional body to give them the status and power for them to function as an professional member of the project team.

10. The planning supervisor shall be individually appointed by the developer/client.

There were 95 percent agreed and 5 percent disagreed with this statement. This question was to obtain the view that the planning supervisor should be impartial or not. In fact, it was one of the suggestions as an amendment to the current CDM requirement. Under the present CDM regulations' requirement, the planning supervisor could be a member of the project team. However, the results showed that engineers would have no objection to appoint planning supervisor independently.

11. A safety file shall be kept to record all safety events from the planning to operation stage of the project by the planning supervisor.

There were 90 percent agreed and 10 percent disagreed with this statement. The safety file was basically a new requirement under the CDM, and this statement was to test the respondents' view about introduction of an additional requirement into the construction industry. The safety file could have to develop into a document attaching to the property lease for future purchaser reference.

12. The planning supervisor should have post-graduate qualification and experience in construction's occupational health and safety

There were 90 percent agreed and 10 percent disagreed with this statement. This statement was to reconfirm the respondents' view on the planning supervisor academic qualification and professional experience. As pointed out

in Chapter 3, it would be ideal for planning supervisor to have construction and safety qualification. It should be noted that before 1996, Hong Kong had no undergraduate or post-graduate course in occupational health and safety or in safety management. At the present moment, there were already four post-graduate courses and one undergraduate course in occupational health and safety. Therefore, it would not be difficult to obtain academic qualification and with growing number of graduates in occupational health and safety. It would be highly feasible for the safety professional to develop their own institution or developed into a professional discipline attaching to a professional body such as the Hong Kong Institution of Engineers.

13. The safety planning supervisor should have the authority to vet the design to ensure that the design is reasonably safe during the construction and operation stage

There were 93 percent agreed and 7 percent disagreed with this statement. The construction of this statement was similar to statement 8 but the wording was slightly changed from 'vet the construction method' to 'vet the design'. In fact, the vetting power was vital for planning supervisor to enforce proper control, not only at the planning and design stage, but also at construction stage when contractor proposed an alternative design. The power to vet the designer proposal was vital because the designer might go for a more economical engineering solution but with higher construction risks. As for the alternative design, the contractor who might propose different structural form to suit their construction method and site conditions, and it could increase the construction safety risk.

14. The planning supervisor should have power to request the developer to provide additional resource and construction time because of safety matter.

There were 88 percent agreed and 12 percent disagreed with this statement.

The construction of this statement was to seek the view that whether engineers would agree to put in additional resource for safety. This was to echo the requirements in the CDM regulations and to test whether engineers would consider safety as part of the works. It must be pointed that without sufficient resource, the contractor would tend to cut corner and lead to decrease in safety standard.

15. The designer can take the role as planning supervisor to look after the occupational health and safety aspect of the entire construction project from planning to operation stage

There were 95 percent agreed and 5 percent disagreed with this statement. The construction of this statement was to test whether the designer should also be the planning supervisor. Under current CDM requirements, there was no restriction on other project parties who could take up the role of planning supervisor. The results indicated that most of the respondents rejected other project to take party as on safety. This statement was also served to valid the results in statement 10.

16. The designer should carry out risk analysis to demonstrate that their design has taken into account of occupational health and safety consideration at the construction and operation stage of the project

There were 93 percent agreed and 7 percent disagreed with this statement. The construction of this statement was to gather view on application of risk analysis as an essential tool for safety decision making. According to United Kingdom's experience, risk analysis was an essential tool for decision making, and it could be used as a defense to any of the criminal charges. Most of the respondents agreed that risk analysis should be carried out as justification for the design.

17. The principal contractor should be responsible for implementation of all the safety measures on site

There were 100 percent agreed with this statement. This statement was to find out whether the principal contractor should still bear the execution duties for site safety. Most the respondents agreed that the contractor should be responsible for the entire site safety, as they were the party who solely controls of the construction works on site.

18. Previous safety performance of contractor shall be taken into account during the selection of contractor process.

There were 88 percent agreed and 12 percent disagreed with this statement. This was not one of requirement of the CDM regulations but it would be one of the effective incentives that the contractor to keep an eye on their safety record. This is due to the fact that the present tender price is very competitive and weighting from the contractor's previous performance would play a vital score to win the contract.

19. The principal contractor shall to regulate their sub-contractors in all aspect of safety matter

There were 95 percent agreed and 5 percent disagreed with this statement. This was a requirement from the CDM that the principal contractor should regulate the sub-contractors on site, and most of the respondents agreed on this arrangement. But it should be pointed out that in some forms of contract there are nominated contractors either by the client or the designers to handle special trades. In this connection, the nominated sub-contractor shall also under the control of the principal contractor in order to avoid communication problem.

20. You would support implementation of a legislation to define the safety obligation of the developer, designer, safety professional and contractor in Hong Kong

There were 100 percent agreed with this statement. The construction of this question was to seek view from the engineers whether they would support for CDM regulation legislation in Hong Kong. All the respondents agreed that they would agree to support a similar CDM legislation to be implemented in Hong Kong.

4.4 Discussion

However, implementation of CDM regulation would have an impact at t territories and industrial level to the Hong Kong construction industry. This study, d to the time limit and nature, can only reflect the some general view of civil engineers CDM regulations. Rowlinson (ref. 6) pointed out that the stakeholders of Hong Ko construction safety should also include: Labour Department, Construction Industri Training Authority, Occupational Health and Safety Council, Contraction Associatio Buildings Department which controls of all the private buildings development in Ho Kong, Housing Department which control of all the public housing constructio Association of Consulting Engineers. In addition, the profession institutions should consulted including the Hong Kong Institution of Engineers, Hong Kong Institution Architects, Hong, Hong Kong Institution of Surveyors.

Within the Government, the consultation should include the following: the Education and Manpower Bureau which is the policy branch of Labour Department, the Planning Environmental and Land Bureau which is the policy branch for Buildings Department, the Housing Bureau which is the policy branch of Housing Department, Works Bureau and the Department of Justice which will be responsible for drafting the Hong Kong version of CDM

regulations. Hence, it can be confirmed that consultation to all above parties and consolidation of their views and comments will be a very timely process.

Apart from consultation, the CDM are also subjected to the followings constrains:

1. There are not solid evident that CDM will suit local conditions;
2. There are not adequate cost/benefit data to justify CDM regulation could improve construction safety;
3. A local version of CDM regulation is still needed to be developed;
4. There are no central agent likes the Health Safety Executives to act as the enforcement agent of CDM in Hong Kong;
5. The relationship between CDM regulation and all other Ordinances still needed to be determined;
6. The qualification and experience requirements of the planning supervisor should also to be defined;
7. To determine the parent Ordinance which the CDM regulation should be attached with.

Alternatively, stage of implementation could be carrying out starting with Works Bureau's Works Departments in order to test the water. In fact, it would just like implementation of the Works Bureau's "Safety Auditing within the Pay for Safety Scheme" starting with selected 36 contracts in a financial Year and subsequently after review and refine of the requirements any 36 contracts can be selected to carry out a second round study. However, if this approach is adopted, the scale of the above mentioned study could be curtailed to suit the requirements of the Works departments' projects. The statutory requirements of CDM may needs to translate into contractual requirements. After several round of implementation of CDM regulation with civil engineering contracts, a suitable version of CDM can be developed, cost and benefit results can be generated another hidden constraints on CDM implementation can be cleared. Based on

these data, full-scale preparation for can then be carried out for global implementation of CDM.