A STUDY OF CONSTRUCTION SAFETY ATTITUDES IN REPAIR, MAINTENANCE, ALTERATION, ADDITION (RMAA) WORKS IN HONG KONG

By

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DECLARATION

I declare that this thesis represents my own work, except where due acknowledgement is made, and that it has not been previously included in a thesis, dissertation or report submitted to this University or any other institution for a degree, diploma or other qualification.

Signed _____

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Abstract

The construction industry is always the main contributor to industrial accidents among different industry. Although safety performance of the construction industry in Hong Kong has continued to improve, the accident rate of Repair, Maintenance, minor Alteration and Addition works (RMAA) sector under construction industry is kept increasing. It properly goes in line with the expansion of market in RMAA in recent years. This emerges the alarm of safety problems in RMAA, especially for the fatal accidents, should press us a need to analyze the safety attitudes in RMAA works in Hong Kong. This dissertation aims to identify causes of accidents in RMAA works; and to investigate the safety attitudes and behavior of different groups of people towards RMAA works.

The causes of accidents and factors affecting construction safety performance are identified by literature review. Human unsafe behavior and organizational factors are the important factors leading to causes of accidents. Personal characteristics may influence safety behavior. Besides, the current government policies and legislations for the construction industry are also reviewed. Questionnaires survey has been conducted with various construction practitioners to examine the causes of accidents and safety attitudes towards RMAA works. By using quantitative approach, statistics analysis has been carried out in this study. The results show that low safety awareness of RMAA workers is the major underlying cause of accident. Organizational factor also influences the safety performance. Different personal characteristics (ages, years of construction experience, education level, with and without RMAA work experience) have different safety attitudes towards RMAA works significantly.

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Abbreviations

BD	Buildings Department
BMMS	Building Management and Maintenance Scheme
CIC	Construction Industry Council
CITA	Construction Industry Training Authority
CMBS	Co-ordinated Maintenance of Buildings Scheme
F&IUO	Factories and Industrial Undertakings Ordinance
HAD	Home Affairs Department
HKHS	Hong Kong Housing Society
ISAS	Independent Safety Audit Scheme
MBIS	Mandatory Building Inspection Scheme
MWIS	Mandatory Window Inspection Scheme
OCs	Owners‘ Corporations
OSHC	Occupational Safety and Health Council
PFSS	Pay for Safety Scheme
PMAC	Property Management Advisory Centre
RMAA	Repair, Maintenance, minor Alteration and Addition
SMEs	Small and Medium Enterprises
SPSS	Statistical Package for the Social Sciences

CHAPTER 1

Background

1.1 Poor Safety Performance in RMAA

1.2 Growing Demands for Repair and Maintenance Works in Hong Kong

1.3 Aims of the Study

1.4 Organization of Study

CHAPTER 1

Background

1.1Poor Safety Performance in RMAA

The construction industry is always the main contributor to industrial accidents among different industry. According to the statistics shown in Table 1.1 of Labour Department (2010), although the fatality rate was more or less the same in the past decade, the number and accident rate per 1000 workers of industrial accidents is kept decreasing from 149.8 in 2000 to 54.6 in 2009. It seems that safety performance of the construction industry in Hong Kong has continued to improve.

Industrial Accidents in Construction Industry (2000 -2009)										
	2000	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**
No. of Accidents	11925	9206	6239	4367	3833	3548	3400	3042	3033	2755
No. of Fatalities	29	28	24	25	17	25	16	19	20	19
Employment Size	79599	80302	73223	64112	63520	59266	52865	50185	49422	50501
Acc. Rate/1000 Workers	149.8	114.6	85.2	68.1	60.3	59.9	64.3	60.6	61.4	54.6
Fatality rate/1000 Workers	0.364	0.349	0.328	0.39	0.268	0.422	0.303	0.379	0.405	0.376

Table 1.1 Industrial Accidents in Construction Industry (2000 -2009)

However, the practitioners are often overlooked the problems with respect to the Repair, Maintenance, minor Alteration and Addition works (RMAA) sector under construction industry. Recently, the accidents caused by the workers in the RMAA building works were reported frequently. One of the cases is about a painter, who worked for the renovation work, suspected with fall from height and subject to death.

Another fatal accident happened in an external pipe maintenance work. The scaffolding worker was hit by a 10-feet-long copper pipe falling from height at the maintenance site. Although, safety performance of the construction industry in Hong Kong has continued to improve, the accident rate of Repair, Maintenance, minor Alteration and Addition (RMAA) works sector under construction industry is kept increasing. According to statistics from Labour Department, the percentage of RMAA accidents to all reported construction accidents in Hong Kong has been increased considerably from 17.9% in 1998 to 50.1% in 2007 (Labour Department, 2008). (Refer to Table 1.2)

RMAA Accidents of the Construction Industry										
	1998	**1999**	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**
(a) All reported construction accidents**	19588 (56)	14078 (47)	11925 (29)	9206 (28)	6239 (24)	4367 (25)	3833 (17)	3548 (25)	3400 (16)	3042 (19)
(b) Accident rate per 1000 workers	247.9	198.4	149.8	114.6	85.2	68.1	60.3	59.9	64.3	60.6
(c) All reported accidents in RMAA Works**	3510 (7)	3328 (10)	3402 (12)	2582 (4)	1925 (10)	1485 (8)	1454 (6)	1509 (12)	1697 (9)	1524 (6)
(i)No. of reported accidents in RMAA Works in public sector sites**	466 0	449 (3)	475 (1)	331 (2)	250 (2)	158 (2)	104 0	64 (2)	60 (5)	50 (1)
No. of reported accidents in RMAA Works in public sector sites**	3044 (7)	2879 (7)	2927 (11)	2251 (2)	1675 (8)	1327 (6)	1350 (6)	1445 (10)	1637 (4)	1474 (5)
Percentage of RMAA accidents to all reported construction accidents [(c)/(a)]	17.9%	23.6%	28.5%	28.0%	30.9%	34.0%	37.9%	42.5%	49.9%	50.1%

Table 1.2 Comparing RMAA accidents with construction accidents

** Figures in the brackets denote the number of fatalities.

The situation is getting worse year by year. It properly goes in line with the expansion of market in RMAA in recent years. It raises the concerned that whether the RMAA projects provide suitable safety equipment and safe environment to their workers. The government and construction industry should pay close attention to RMAA accidents. This emerges the alarm of safety problems in RMAA, especially for the fatal accidents, should press us a need to analyze the safety attitudes in RMAA Works in Hong Kong.

1.2 Growing Demands for Repair and Maintenance Works in Hong Kong

There is an increasing demand on repair and maintenance of existing housing. About one out of three of the buildings in Hong Kong had been built for more than 20 years. A statistic in 2007 showed, total construction market of Hong Kong, repair and maintenance sector has taken into account for 53.2 %. (Census and Statistics Department, 2008). RMAA works include minor alterations, repairs, maintenance and interior decoration of existing buildings. In 2009, the Hong Kong Housing Society implemented the "Operation Building Bright" programme and the repair works for buildings were commenced at that year. As the result, the demand on workers for repair and maintenance is substantially increasing and it raises safety concern of the RMAA works.

1.3 Aims of the Study

Safety research of the construction industry is abundant. However, they are generally focusing on the general construction works. It is limited research investigating particular for RMAA work. In fact the accident rate in Hong Kong reveals that it does contribute to construction accidents. It is important issue for Hong Kong since the renovation and maintenance work demand for old buildings is increasing. Actually, RMAA work involves different types of workers comparing to those general construction and thus the work nature may not be the same. Therefore, to tackle problem, it is more suitable to examine the RMAA work safety individually.

Not much literature is available about RMAA sector and it is overlooked in the past. Therefore, this dissertation is trying to address part of research on RMAA works in Hong Kong. The study aims to analyze the construction safety attitudes of repair, maintenance, alteration and addition works in Hong Kong.

The objectives are: (1) to identify causes of accidents in RMAA works; and (2) to investigate the safety attitudes and behavior of different groups of people towards RMAA works. Also, it is important is to address the attention to safety of RMAA works in order to move forward to have more research in RMAA sector including management, safety culture, climate and behavior to performance.

1.4 Organization of Study

This study is divided into six chapters. Chapter 1 describes the background information regarding construction related accidents in Hong Kong and the existing RMAA works concern, the purpose and objective of the study. Chapter 2 and Chapter 3 review the literature, and relevant construction policies and regulations in Hong Kong. Chapter 4 illustrates the research methodology framework of this dissertation. Data description and data analysis and discussions are presented in Chapter 5 and Chapter 6. Chapter 7 discusses the findings and draws the conclusions and provides recommendations on improving safety attitudes in order to reduce the accident rates in RMAA works.

CHAPTER 2

Literature Review

2.1 Underlining Cause of Accidents

2.2 Safety Performance in Construction

2.3 Factors Affecting Safety Performance

2.4 Summary of Literature Review

CHAPTER 2

Literature Review

2.1 Underlining Cause of Accidents

In the construction industry, it is limited research focusing on specific RMAA work. One of them is the recent findings about the cause of accident in RMAA works in Hong Kong. Although it indicated that accidents are caused by some unique factors of RMAA workplace setting and task characteristics but at the same time share certain similarities with common safety problems of the whole construction industry (Hon, et al., 2010). The most important underlying causes of accidents in RMAA works are _poor safety conscientiousness of RMAA workers', _RMAA workers underestimate potential risks when performing small tasks for a short period of time' and _personal protective equipment not used, incorrectly used or not provided'. It is commonly known as the low safety awareness of RMAA workers.

It is similar to the root cause of fatalities in Singapore (Yean, et al., 2009) includes rushing to complete the work, working without using personal protective equipment and lack of safety awareness. The findings suggested that fatal accidents were caused by human beings and could have been avoided if individuals had been more careful. It is supported by Reasons (1995) who argued that unsafe behavior is a crucial factor in the accident chain of events.

In the whole construction industry, besides the human unsafe behavior to be the cause of accidents, organizational factors are one of the most important factors leading to

unsafe behavior. Mullen (2004) found that role overload, performance over safety, socialization influence, safety attitudes and perceived risks are the organizational factors leading to unsafe behavior. Also, image is the second reason why workers act unsafely. Worker wants to be seen as tough and as competent person. The third reason is to avoid teasing and harassment from coworkers and fear of losing the job or existing position. Yean, et al. (2009) noted that management is at fault because they may pressurize workers to complete the job as soon as possible from time to time and forgo safety checks and these will led workers disregard safety. As the result, selecting an inappropriate contractor who has no safety culture has a domino effect on site safety. The cause accidents are known as personal negligence, carelessness and lack of supervision. The study of Tam et al. (2004) in China revealed that behavior of contractors on safety management is of grave concern. The low safety awareness of top management, poor safety awareness of project managers, lack of training, reluctance to make contributions to safety and reckless operation are the attributes of poor safety management leads to accidents. In Hong Kong, a study of Lam and Rowlinson (1997) stated the organization factors: high mobility of workers, influx of immigrants or unskillful workers, too much overtime, changes in supervisory staff, shortage of safety inspectors, inadequate safety training to workers.

There are some classifications of root causes of accidents in the construction industry. In the United States, Abdelhamid and Everett (2000) classified it into three areas: failure to identify unsafe condition; decision to proceed with a work activity after identifying an unsafe condition; and unsafe work. The study also found that unsafe conditions are often formed by interlinked management actions, unsafe acts of workers/coworkers; activities related to non-human; and environment of construction

work. Cheng, et al. (2004) found three causes are related to workers which are lack of attention to personal safety protection by workers, insufficient safety training and tiredness of workers. Two causes are related to organizational factor which are lack of attention to safety management by main contractors/project managers, and inadequate setting of safety level. Remain is the poor quality of construction materials and equipments.

2.2 Safety Performance in Construction

2.2.1 *Concept of Safety Culture and Safety Climate*

The term „safety culture‘ first made its appearance in 1987 Organization for Economic Co-operation and Development Nuclear Agency report (INSAG 1988) on the 1986 Chernobyl disaster (Mohamed, 2003). The Advisory Committee on the Safety of Nuclear Installations 1993 provides the definition that „the safety culture of an organization is the product of individual and group values, attitudes perceptions, competencies, and patterns of behavior that determine the commitment to and the style and proficiency of an organization‘s health and safety management.” (Choudhry, et al., 2007) Numerous definitions of safety culture exist in the academic literature. Table 2.1 shows the examples of a few definitions which were resulted in the research carried out from Choudhry, et al. (2007).

Reference	Definition of safety culture
Hale (2002)	Safety culture refers to "the attitudes, beliefs and perceptions shared by natural groups as defining norms and values, which determine how they act and react in relation to risks and risk control systems."
Guldenmund (2000)	Safety culture is those aspects of the organizational culture that will impact on attitudes and behavior related to increasing or decreasing risk.
Cooper (2000)	Culture is "the product of multiple goal-directed interactions between people psychological, jobs behavioral and the organization situational; while safety culture is "that observable degree of effort by which all organizational members directs their attention and actions toward improving safety on a daily basis."
Mohamed (2003)	Safety culture is a subfacet of organizational culture that affects workers' attitudes and behavior in relation to an organization's ongoing safety performance.

Table 2.1 Definition of safety culture

Safety culture is concerned with the attitudes, behaviors, systems and environmental factors that promote effective health and safety management (Peckitt, et al., 2004). The concept of safety culture has become part of predominant safety paradigms, being increasingly cited in discussions on the aetiology of accidents and managing high-risk processes. Safety culture is one of the organization cultures. Within organizations, sub-cultures form around different roles, functions and levels of power. Most organizations have separate executives, management and worker cultures (Schein, 1997). The management culture tends to focus upon managerial and resource issues, while worker culture is more likely to focus on production and rewards. To work effectively, an organization must ensure that these different cultures can mesh together

and communicate effectively (Peckitt, et al., 2004).

Although Blockley (1995) advocated that the construction industry would be better characterized as one with a poor safety culture and that attempts to improve the safety record will not be fully effective until the safety culture is improved; progress over the last decade on defining and measuring the safety culture concept in construction appears to have been somewhat slow. Zohar (1980) introduced ―safety climate" as ―a summary of molar perceptions that employees share about their work environment." Mohamed (2003) advocated confusion between the ―culture'' and ―climate'' terms might have contributed to such a slow progress.

Researchers considered safety climate as a subcomponent of the safety culture (Cooper, 2000; Neal, et al., 2000; Choudhry and Fang, 2005). It is the reflection of actual safety culture (Lee and Harrison, 2000; Flin, et al., 2000; Guldenmund, 2000). Safety climate is often perceived as more superficial than the safety culture in that it involves the current position of a company (Glendon and Stanton, 2000). Gadd (2002) have described safety climate as an indicator of the overall safety culture of an organization. Mohamed (2003) suggested although these two terms have been used interchangeably due to the relationship and some overlap between them, climate refers only to the people's perception of the value of safety in the work environment. According to Cooper and Philips (1994), safety climate is concerned with the shared perceptions and beliefs that managers and workers hold regarding safety in the workplace, i.e., safety climate is, to some extent, depended on the prevalent safety culture. Mohamed (2003) further stated that safety climate is largely a product of the safety culture, and the two terms should not be viewed as alternatives.

2.2.2 ***Lagged Relationship among Safety Climate, Safety Behavior and Performance***

A study of lagged relationships among safety climate, safety motivation, safety behavior, and accidents at the individual and group levels, Neal and Griffin (2006) measured perceptions of safety climate, motivation, and behavior at 2 time points and linked them to prior and subsequent levels of accidents over a 5-year period in Australia. Neal and Griffin (2006) claimed that when individuals perceive there is a safe working climate; they will reciprocate by allocating effort to discretionary safety activities. This supports the arguments being made by many in the field that organizations attempting to improve safety should focus on changing the work environment to motivate people to actively participate in safety activities.

Numbers of studies showed that safety climate has a significant influence on individual safety behaviour, and there is a close relationship between individual safety behaviour and safety performance (Tarrants, 1980; Sawacha, et al., 1999). Consequently, the influence of safety climate on individual safety behaviour transfers to safety performance. Thus, improving safety climate is an effective way to enhance safe performance.

2.3 Factors Affecting Safety Performance

2.3.1 ***Psychological strain***

Psychological distress has direct and mediating effects on the relationship between safety attitudes and accident rates (Siu, el at., 2004). Workers who perceived negative safety attitudes showed by management or colleagues in the workplace would feel distressed, this in turn would cause them to have a greater possibility of participation

by accident at work. Dunbar (1993) considered safety compliance could be predicted by affect, anxiety, and depression shown by the workers. Hoffmann (1996) concluded that a perception of high role overload (an indication of perceived work pressure) was associated with an increased tendency to engage in unsafe acts based on the results of a cross-sectional survey in a chemical processing plant. It was because workers who perceived a high level of performance pressure would focus their attention on completing the work and less on the safety of their work procedures. It is also stated in Choudhry and Fang (2008), workers were involved in unsafe behavior because of: a lack of safety awareness; to exhibit of being ‗tough guys'; work pressure; co-workers' attitudes; and other organizational, economic and psychological factors.

2.3.2 ***Personal Characteristics***

Personal characteristics include demographic information, such as gender, age, marital status, education level, and other personal information. These personal characteristics may influence safety climate and result in influencing the individual safety behavior (Hinze, 1997). However, there was not much research that systematically analysed the relationship between these personal characteristics and safety climate.

The research (Lee and Harrison, 2000) assessed risk perceptions and attitudes to safety among 5,295 employees at a large British nuclear reprocessing plant using a questionnaire of 172 items. Major differences of results were found in the attitudes and perceptions of different occupational groups, according to gender, age, experience, supervisor status and type of shift worked,. Lee and Harrison (2000) also found that these differences in safety perception and attitudes were clearly linked with prior accident involvement.

Fang, et al. (2006) stated the roles and influences of fellow workers and safety resources on safety climate are emphasized. There were statistically significant relationships found between safety climate and some personal characteristics and individual safety behavior. Firstly, the employees with older, married, or with more dependent family members would have a more positive perception of the safety climate than those younger, single, or with fewer family members to support. Fang, et al. (2006) stated that with increased social responsibilities, people will have a better perception of their work environment as well as better safety attitudes and beliefs. Secondly, the education level and safety knowledge level are also showed important relationship to safety climate which is the employees with an education level below primary school have a less positive perception of the safety climate than others with higher education level.

2.3.3 *Ages Differences in Safety Attitudes and Safety Performance*

Older workers are more experienced in the work and have greater job knowledge, skills, and patience than younger counterparts. Some research has been well documented that age and accident rates are negatively related. (Frone, 1998; Kingsma, 1994; Stalneker, 1998; Topf, 2000). However, when injures do occur, older workers are usually more severely hurt, and fatalities occur more frequently among older workers (Topf, 2000). In additional, Topf (2000) analyzes some of the possible reasons why younger workers may be at increased risk of work-related injury: limited job knowledge, training, and skills, and perhaps less sense of responsibility. These are the factors points to the importance of safety attitudes in performing safely at work.

Siu, et al. (2003) showed some older workers do indeed have more positive attitudes toward safety, compared with younger workers. Older workers are more willing to check the safety equipment and assess general housekeeping in a positive way. They are also more probably to perceive more encouragement and support from management/supervisor. Moreover, older workers usually with more experienced and therefore they have decreased risk at work. Siu, et al. (2003) also suggested another reason may be that older workers are aware that fewer job opportunities are available for them, so they are more committed at work and are willing to comply with safety rules. Siu, et al. (2003) regarded that older construction workers in Hong Kong are quite capable of learning safety regulations and safety system at work as well as to comply with safety regulations. Perhaps it is due to the job knowledge structures increase with age and compensate for declines in ability. Besides, older construction workers could be more knowledgeable and experienced, displaying more positive attitudes to safety, and possibly more committed to work than younger workers.

2.3.4 ***Small Size of RMAA Work***

A statistical analysis in reducing construction site accident frequency rate in Hong Kong by Labour Department (2011) showed that larger companies have generally better average site accident frequency rate than that of the smaller companies. Although, the result cannot prove significant correlation between them, it is generally believed that larger companies may have better ability to combat site accident frequency rate (Labour Department, 2011). Possibly, larger companies may have more resources to implement more structured and formalised safety programmes to enhance work safety in the sites. There is limited study exists to describe the effects of firm size on occupational injury rates in the construction industry. In manufacturing

industries the studies are conflicting. Mason (1976) found injuries frequency in the in British Columbia decrease as the firm size increases. Yet a report in Germany showed that as a firm size increase, injury frequency also increases (Sust, 1971). In the study of construction safety management, Tam and Fung (1996) found that accident rate decreases as the firm size increases. This result showed in the more structured safety programme, the stronger management commitment. McVittie (1997) found that there is consistent relationship between firm size and injury frequency in construction industry. As firm size increases, injury frequency decreases. The difference in injury performance may due to several factors which are better organization, greater awareness of health and safety, higher rates of unionization and better training. Shaw (1998) found that small businesses faced with specific health and safety challenges, many firms lacked adequate resources and were often struggling to survive. Furthermore, they lacked an understanding of their obligation and the health and safety issues of their processes. It is concerned that normally RMAA works are responsible by the small firm and this can be one of the factors related to the accidents and injuries of workers.

Besides, due to RMAA work nature in Hong Kong, the workers are generally less skillful than those in new building construction site. Some of them are only part-time or temporary workers with less experience with construction industry. Also, they may unfamiliar to the working environment as they are usually with high mobility rate. Consequently, the unfavorable conditions give rises to the risk.

2.4 Summary of Literature Review

Safety research of construction industry is abundant; however, it is limited research focusing on specific RMAA work. It seems to be overlooked by the society; yet, the accident rate shows that it increased considerably in the recent years. It emerges the importance to investigate the safety problems of RMAA work. From the study of Hon, et al. (2010), it showed accidents are caused by some unique factors of RMAA workplace setting and task characteristics but at the same time share certain similarities with common safety problems of the whole construction industry. Human and organization factor are identified to be the cause of accidents by a number of safety researches in the construction industry as a whole. Therefore, RMAA safety culture, climate, attitudes and behavior are sharing some of the similarity with the whole construction industry.

Numerous of research also indicated that psychology strain, personal characteristic such as age, gender, marital status and education level, and other personal information may influence safety climate and consequently influence the individual safety behavior. In addition, size of the company may also relate to the accident rate. Small firms lacked adequate resources is considered to be one of the factor related to the accidents and injuries of workers.

CHAPTER 3

Current Safety Performance in Hong Kong Construction Industry

3.1 Government and Society Policy

3.2 Legislation

3.3 Safety Education, Training and Promotion

CHAPTER 3

Current Safety Performance in Hong Kong Construction Industry

3.1 Government and Society Policy

3.1.1 *Safety Management System in Hong Kong*

The government is promoting the implementation of safety management system in the Civil Service. In 1995, the government has conducted a comprehensive review of industrial safety with a view to mapping out Hong Kong's long-term safety strategies (Civil Service Bureau, 1995). The Review has concluded that for Hong Kong to achieve high standards of safety and health at work, enterprises must embrace self-regulation and safety management and recommended that the government should provide a framework within which self-regulation was to be achieved through a company system of safety management. "Safety Management" refers the management functions connected with the carrying on of an enterprise that relate to the safety of personnel in the enterprise, including —

- planning, developing, organizing and implementing of a safety policy;
- measuring or auditing of the performance of those functions;

"Safety management system" means a system which provides safety management in an enterprise. A safety management system consists of the following elements (Labour Department, 1999):

1. A safety policy which states the commitment of the proprietor or contractor to safety and health at work;

2. A structure to assure implementation of the commitment to safety and health at work;
3. Training to equip personnel with knowledge to work safely and without risk to health;
4. In-house safety rules to provide instruction for achieving safety management objectives;
5. A programme of inspection to identify hazardous conditions and for the rectification of any such conditions at regular intervals or as appropriate;
6. A programme to identify hazardous exposure or the risk of such exposure to the workers and to provide suitable personal protective equipment as a last resort where engineering control methods are not feasible;
7. Investigation of accidents or incidents to find out the cause of any accident or incident and to develop prompt arrangements to prevent recurrence;
8. Emergency preparedness to develop, communicate and execute plans prescribing the effective management of emergency situations;
9. Evaluation, selection and control of sub-contractors to ensure that sub-contractors are fully aware of their safety obligations and are in fact meeting them;
10. Safety committees to identify, recommend and keep under review measures to improve the safety and health at work;
11. Evaluation of job related hazards or potential hazards and development of safety procedures;
12. Promotion, development and maintenance of safety and health awareness in a workplace;

13. A programme for accident control and elimination of hazards before exposing workers to any adverse work environment; and
14. A programme to protect workers from occupational health hazards.

The brief model for development, implementation and maintenance of a safety management system containing the above 14 elements is shown in the Appendix F (Labour Department, 1999).

3.1.2 *Pay for Safety Scheme & Independent Safety Audit Scheme*

In 1996, the government introduced two schemes, the Pay for Safety Scheme (PFSS) and Independent Safety Audit Scheme (ISAS), to encourage public works contractors to set up efficient safety management systems and to enhance the standard of safety performance of contractors. Under the trial PFSS, participating contracts included a schedule of full specified pre-priced site safety items in the Bills of Quantities, the purpose of which was to remove site safety from the realm of competitive tendering. Payment would only be made to the contractor if he complied with the requirement and performed of the contractors and to certify payment. ISAS was set up to ensure the safety plans pledged in a contract are actually executed to certain standards. It is managed by Occupational Safety and Health Council (OSHC).

3.1.3 *Occupational Safety Charter*

The Labour Department and the Occupational Safety & Health Council jointly launch the "Occupational Safety Charter" in 1996. It highlights the commitment of both the employers and employees in creating and maintaining a safe and healthy work environment. It states safety goals of the organization and points out the

responsibilities of various parties. To establish a Safety Charter, employers can use it as basis for building a safety management system (OSHC, 1996).

The key areas of a safety management system are:

- Policy — to define employers' commitment to communicating, implementing and maintaining a safe workplace.
- Planning — to ensure projects are reviewed at the design stage so as to minimize future risks and ensure plans are in place to deal with emergencies safely and effectively.
- Procedures — to make sure employees understand clearly the in-house safety rules and regulations, and their obligations.
- Investigations — to ensure all accidents and incidents at work are analyzed, conclusions are properly drawn and appropriate action taken.
- Subcontracting — to govern the responsibilities of your contractors, so that they are fully aware of, and are capable of meeting your organization's safety management obligations.

3.1.4 ***Considerate Contractors Site Award Scheme***

Considerate Contractors Site Award Scheme was jointly organized by Development Bureau and Construction Industry Council since 1995 to promote a considerate attitudes and good site safety, health and environmental practices for both Public Works and non-Public Works sites. Commencing from 2011, a new category of award, the Model Workers Award is introduced to recognize the efforts paid by the workers.

The categories of award for the 2011 Scheme are as follows (Development Bureau, 2011):

i. **Considerate Contractors Site Award (Repair, Maintenance, Alteration and Addition (RMAA) Works)**;
ii. Considerate Contractors Site Award (New Works); and
iii. Outstanding Environmental Management and Performance Award
iv. Model Workers Award

3.1.5 ***Construction industry Safety Award Scheme***

Labour Department launches Construction Industry Safety Award Scheme. The scheme aims to enhance the awareness among construction contractors and workers of safety and health at work, to foster a positive safety culture, as well as to encourage the adoption of safety working practices. The Construction Industry Safety Award Scheme was jointly organized by OSHC, government and other construction associations and unions. The "Construction Sites" awards will be divided into seven categories. They included two new categories of awards - **Renovation and Maintenance Works, and Renovation and Maintenance Works (Sub-contractors)** - to raise the safety and health awareness of personnel in the sector. The remaining five categories are Building Sites (Public Sector), Building Sites (Private Sector), Civil Engineering Sites, Building Sites (Sub-contractors) and Civil Engineering Sites (Sub-contractors).

3.1.6 ***Co-ordinated Maintenance of Buildings Scheme***

Buildings Department (BD) associating with six other government departments, including Home Affairs Department (HAD), Fire Services Department, Electrical and

Mechanical Services Department, Food and Environmental Hygiene Department, Water Supplies Department and Environmental Protection Department, has launched a Co-ordinated Maintenance of Buildings Scheme (CMBS) in Hong Kong to assist building owners and owners‘ corporation (OCs) in pursuing a comprehensive building management and maintenance programme since November 2000,. From 2005 onward, Hong Kong Housing Society (HKHS) is invited to provide free advice to the owners concerned.

BD (2000) will co-ordinate actions of these departments to ensure efficiency and cost-effectiveness, with minimal inconvenience to owners and OCs. For those selected target buildings, BD will be responsible for -

- the conduction, in association with other government departments, a survey of the target buildings and determining the scope and nature of improvement works required;
- the arrangement, through the relevant District Office, a meeting with the building owners or OCs to advise them of the results of the survey and explaining to them in detail the requisite maintenance and repair works and the technical issues involved; and
- the initial joint enforcement action with the other government departments, should the building owners or OCs not proceed with the required works within a reasonable period of time.

In order to assist and facilitate the satisfactory completion of the improvement works HAD will also advise building owners and OCs on management matters and proper OCs operations in order to assist them in resolving management problems.

3.1.7 *Building Management and Maintenance Scheme*

Hong Kong Housing Society (HKHS) launched Building Management and Maintenance Scheme (BMMS) in 2005. BMMS works with homeowners of private buildings, encouraging both the management and maintenance of their properties with the provision of knowledge, education and advice as well as financial support where necessary. There are four main areas of the BMMS (HKHS, 2005).

- **Education and Publicity:** Promotional and educational activities will be held regularly to promote proper management and maintenance, including seminars, workshops, property management courses, carnivals and distribution of pamphlets.
- **Guidance and Advice:** HKHS provides free guidance and advice on building management and maintenance to the public at the Property Management Advisory Centre (PMAC). The Building Maintenance Toolkit provides a practical, user-friendly and informative guide to owners and OCs. PMACs will participate in the "Co-ordinated Maintenance of Buildings Scheme" of the Buildings Department to provide guidance for the owners or OCs.
- **Incentives and Assistance:** HKHS provides "one-stop" technical advice and assistance to encourage the owners to properly manage and maintain their buildings. Two Building Management Incentive Schemes have been launched to encourage owners to manage and maintain their buildings.
- **Loan Scheme:** The "Home Renovation Loan Scheme" and "Home Renovation Loan Scheme" encourages the owners to carry out flat interior renovation for the improvement of safety and hygienic conditions. This may also help add value to the properties.

3.1.8 ***Mandatory Building Inspection Scheme and Mandatory Window Inspection Scheme***

The government implements Mandatory Building Inspection Scheme (MBIS) and Mandatory Window Inspection Scheme (MWIS), requiring owners to regularly inspect and repair their buildings and windows. The BD (2010) will select target buildings for carrying out mandatory building and window inspections according to factors including building age, building condition, records of repair, location, etc. When to select target buildings, the BD will make reference to the advice of selection panels comprising community representatives and professionals. The government also implemented various support measures for owners, and obtained the agreement of the Hong Kong Housing Society (HKHS) to help provide assistance to owners in need.

3.1.9 ***Operation Building Bright***

In 2009, Hong Kong Housing Society and Urban Renewal Authority launched a $1 billion "Operation Building Bright" to provide subsides and one-stop technical assistance to assist owners of about 1,000 old buildings to carry out repair works, including old buildings without owners' corporations (OCs). The aims of Operation is to achieve the dual objectives of creating more job opportunities for the construction sector in the near future and improving building safety and the cityscape (HKHS, 2009). The Operation covers two categories of target buildings (See Appendix G)

3.1.10 ***Minor Works Control System***

The Minor Works Control System (MWCS) was fully implemented on 31 December 2010 (BD, 2010). Any member of the public who intend to carry out minor works should employ prescribed building professionals and/or prescribed registered contractors to do so. Under the MWCS, a register of minor works contractors is established. Contractor companies and individual practitioners are required to register as minor works contractors of the relevant classes and types or items by virtue of their work experience, qualifications and competence. MWCS aims to facilitate members of the public to carry out minor works in private buildings lawfully through simplified procedures and thereby improve the building safety in Hong Kong.

3.1.11 ***OSH Enhancement Scheme***

OSHC supports the Small and medium enterprises (SMEs) by sponsorship, launched "OSH Enhancement Scheme" including "SME Sponsorship Scheme for Fall Arresting Equipment for Renovation & Maintenance Work", "Safe Ladder Sponsorship Scheme for SMEs" and "Sponsorship Scheme for Safety Inspection on Building Maintenance Works" (OSHC, 2003). Each company can apply once and create a financial subsidy to the SMEs for safety equipment. For Safety Inspection Scheme, maximum two safety inspections could be conducted with a recommend improvement reports. This can enhance the safety awareness of the company to have a better safety performance in the present work as well as future safety management.

3.2 Legislation

In Hong Kong, no matter general construction or RMAA works are under the same industrial safety legislation. It lays down proper safety standards and securing compliance with those standards to prevent the occurrence of accidents. One of the Ordinances is the Factories and Industrial Undertakings Ordinance (F&IUO).

3.2.1 *The Factories and Industrial Undertakings Ordinance (F&IUO)*

Construction site safety in Hong Kong is mainly governed by the Factories and Industrial Undertakings Ordinance (F&IUO), Chapter 59 and its subsidiary Regulations. The Factories and Industrial Undertakings Ordinance (F&IUO) controls safety and health at work relating to industrial undertakings including construction site. Under the provisions, the employers are responsible for taking all reasonably practical steps, to ensure the health and safety of all persons employed at the workplace. Besides, the workers also have the duty to exercise reasonable care at work and cooperate with the employers on safety measures. The ordinance also provides the power for factory inspectors to inspect industrial undertakings and to prosecute for breach of law. Moreover, it confers on the Commissioner for Labour the power to legislate for industrial safety and health.

However, under the Construction Sites (Safety) Regulations of F&IUO, notification of commencement of small-scale works, i.e. employing not more than 10 workmen or the duration of the work less than 6 weeks, to the Commissioner for Labour is not required. As such, most of the RMAA works would not come to the notice requirements by the Labour Department because of their small-scaled and in short

duration. As the result, for RMAA project, which always with small-scale works, is difficult to monitor and control in the sake of safety for these.

In additions, under Factories and Industrial Undertakings (Safety Officers and Safety Supervisors) Regulations, one safety officer should only be needed when the total aggregate number of persons employed at construction sites is 100 or more while only one safety supervisor on each construction site is needed when the total number of persons employed is 20 or more. In small-sized project or company we can assume that the resource put on the safety would be less. Thereby, there is another problem to provide a safety provision to the workers under RMAA work projects.

3.2.2 ***Construction Workers Registration Ordinance***

Construction Workers Registration Ordinance (Chapter 583) is an ordinance to provide for the registration of construction workers with the establishment of a Construction Workers Registration Authority. The authority should be responsible for the administration of the Ordinance and the supervision of the registration of persons. The main objectives of the Ordinance are to ensure the quality of construction workers through certification of skill levels and to obtain more reliable data on labour supply to facilitate manpower planning and training. Also, enhancing quality culture in the construction industry by mapping a clear career path along a three-tier model, namely, registered skilled worker, registered semiskilled worker and registered general worker, thereby motivating the workers to aim for higher skill levels, thus higher status and income.

3.3 Safety Education, Training and Promotion

The Labour Department, Construction Industry Council (CIC) (CIC is established under the Construction Industry Council Ordinance in 2006, former CITA), Occupational Safety & Health Council (OSHC) (OSHC is established under the Occupational Safety Health Council Ordinance in 1988, the Council is a statutory body for promoting safety and health at work and sustaining the valuable workforce of Hong Kong) and many other institutions in Hong Kong offer various types of safety courses to personnel working in construction industry ranging from engineer, safety supervisor and worker. Some of the courses are general safety courses and some are specific in one trade. Although it is seldom to have courses specific in RMAA works, the general safety knowledge like safety of scaffolding, confined spaces, electrical, etc. may also apply to RMAA works. Actually, OSHC also provide courses particular for RMAA works, for example, it recently provided a new course for safety of air-conditioning repair and maintenance work.

Besides, Labour Department and OSHC also participant in promotion of construction safety and health by publicity activities through the mass media, open seminars, exhibitions, and CD-ROM format copy, posters and leaflets for public collection. For particular, in 2004 and 2005, OSHC has published books "Safety for Renovation and Maintenance Work" and "Property Management Industry – OSH Management for Renovation and Maintenance Work" with 10 and 36 pages respectively, highlighting the important issue of safety of renovation and maintenance work.

CHAPTER 4

Research Methodology

4.1 Introduction

4.2 Design of Research

4.3 Statistics Analysis

CHAPTER 4

Research Methodology

4.1 Introduction

The purpose of the study is to identify causes of accidents in RMAA works and to investigate the safety attitudes and behavior of different groups of people towards RMAA works in Hong Kong.

This chapter included descriptions of the methods of data collection, data processing, and data analysis. This chapter was divided into three sections: introduction, design of research and statistical procedures.

4.2 Design of Research

Quantitative research method was used in the study. Quantitative research used numbers and statistical methods. It based on numerical measurements of specific aspects of phenomena and abstracts from particular instances to seek general description or to test causal hypothesis (King, et al., 1994). It was a statistical method to analysis for the study.

Three groups of practitioners were set to be the target respondents for the study and were defined as followed.

(I) Consultants	**Architects** **Surveyors**
(II) Managers	**Project directors** **Project Managers** **Contract Managers** **Safety Managers** **Site Agents**
(III) Supervisory Staffs	**Engineers** **Safety Officers** **Safety Supervisors** **Foremen**

Table 4.1 Target respondents for the study

One set of the questionnaire was used in the study. It was an effective method for quantitative analysis by to seeking a large sample size (Hox et al., 2008). The questionnaire was sent to 100 construction firms listed under the General Building Contractors‘ Register and Minor Works Contractors‘ Register of Building Department and consultancy firms by personal, mail and e-mail to collect the quantitative data.

The questionnaire (see Appendix A) consisted of two main sections as follow:

i. The first section survey collected the general information of demographic factors, e.g. age, career position, year of experience, education level and RMAA experience.

ii. The second section survey collected respondents‘ views of how they behave the attitudes and perceptions about RMAA accidents and safety, and the situation of safety aspect that they work in.

In the second section of the survey, it was divided into three categories: causes of accidents, the safety attitudes towards RMAA works, current policies implemented by the government and construction companies. For the first category, causes of accidents, ranking question was set to investigate the causes of RMAA accidents. For the second category, safety attitudes towards RMAA work. Eight questions were designed in three formats: ranking, multiple choices with one or some may more than one answers and Likert-type format of five-point scale. For the third category, current policies implemented by the government and construction companies, multiple choices format is used.

4.3 Statistics Analysis

Statistical analyses was performed by utilizing the "*MS Excel 2007*" and the *"Statistical Package for the Social Sciences for Windows, Version 19.0 (SPSS 19.0)"*.

Data description was conducted mainly by MS Excel 2007. Tables and charts were formed. Fundamental data description and analysis will be discussed.

Besides, other data analysis statistical procedures adopted in this study by SPSS was as the following:

1. Reliability Analysis – Reliability analysis studied the properties of measurement scales and the items that composed the scales. Alpha Coefficient was utilized to examine the actual reliability and the relationships between individual items in the scale as used in this study.

2. Pearson‘s Correlation Coefficient (r) – the correlation between two variables (factors) was the degree of linear relationship between them, such that high scores on one tended to go with high scores on the other or, in the case of negative correlation, such that high scores on one tended to go with low scores on the other (Corston and Colman, 2000). Pearson‘s Correlation Coefficient (r) is one of the most common measurements for Bivariate Analysis. Some of significant correlated items were highlight to determine the relationship of safety attitudes.

3. Independent Samples T-Test – upon the completion of calculating correlation coefficients for the specified relationships, a t-test was employed to establish the significance of a difference between the means by the standard error of this difference of two independent groups (Corston and Colman, 2000). Different groups of respondents with significant different choices of answers were highlight to determine the divergence of safety attitudes.

CHAPTER 5

Data Descriptions of Survey

5.1 Introduction

5.2 Demography of Survey Participants

5.3 Results of the RMAA Works Safety Survey

CHAPTER 5

Data Descriptions of Survey

5.1 Introduction

To identify causes of accidents in RMAA works in relation to safety attitudes and to investigate the safety attitudes and behavior of different groups of people towards RMAA works in Hong Kong, a questionnaire was conducted in Hong Kong. The data collection process was started in February 2011. A total of 62 effective responses were finally collected at the end of the date collection period.

In this chapter, the data descriptions are divided into 3 parts; causes of accidents, the safety attitudes towards RMAA works, current policies implemented by the government and construction companies. The 62 effective respondents were explored.

5.2 Demography of Survey Participants

The survey was conducted from January 2011 to February 2011. The respondents included general main contractors, RMAA and minor works contractor and consultants. There were 14 out of 100 construction firm with a total of 62 participants joined this survey, in which there were 3 directors, 10 managers, 10 architects, 28 engineers, 1 surveyor, 5 safety supervisors and 5 foremen. (Figure 5.1)

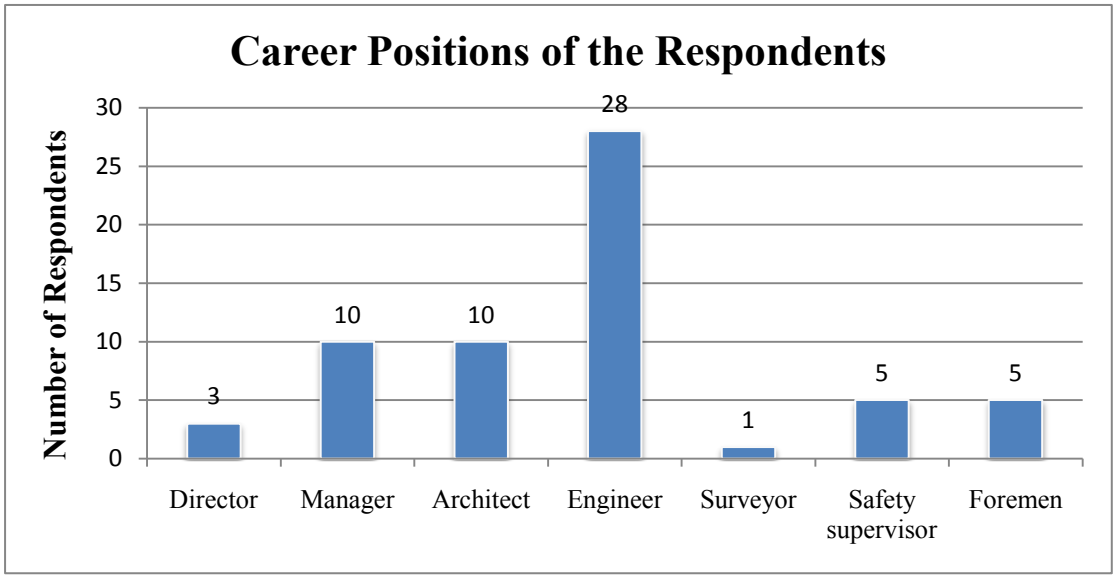

Figure 5.1 Career positions of the respondents

Following were the basic information of the respondents: For the respondents‘ gender, 82% and 18% of them were male and female respectively. (Figure 5.2)

For the ages, 41% of respondents were 18 to 25 years old, 38% of respondents was 26 to 35 years old, 11% of respondents were 36 to 45 years old, 8% of respondents were 46 to 55 years old and only 2% of respondents were 56 years old or above. (Figure 5.3)

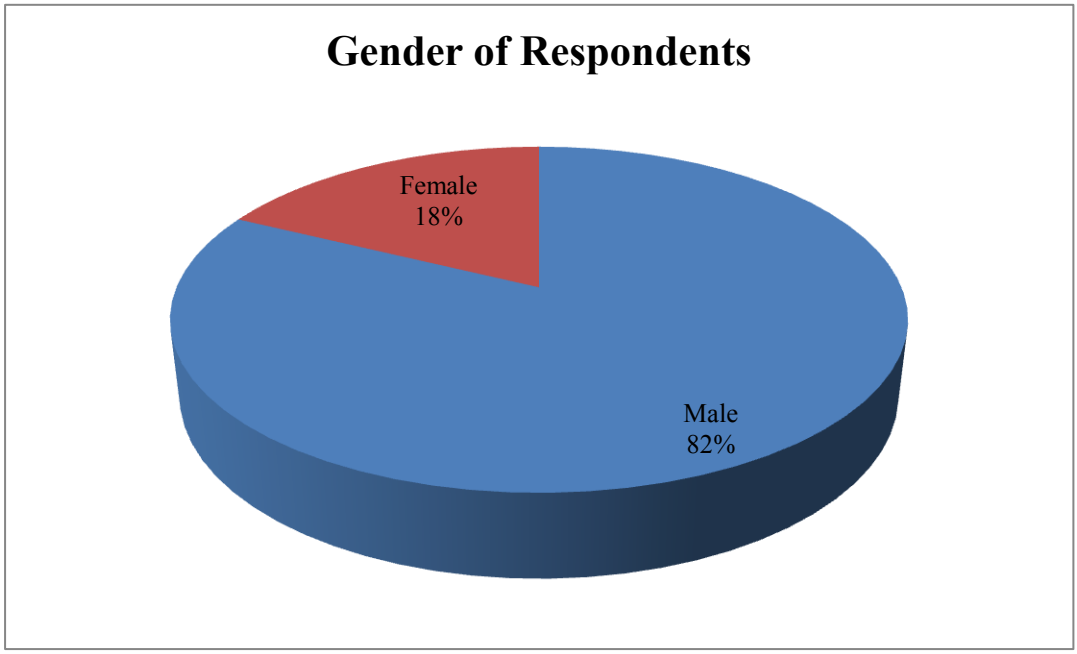

Figure 5.2 Gender of respondents

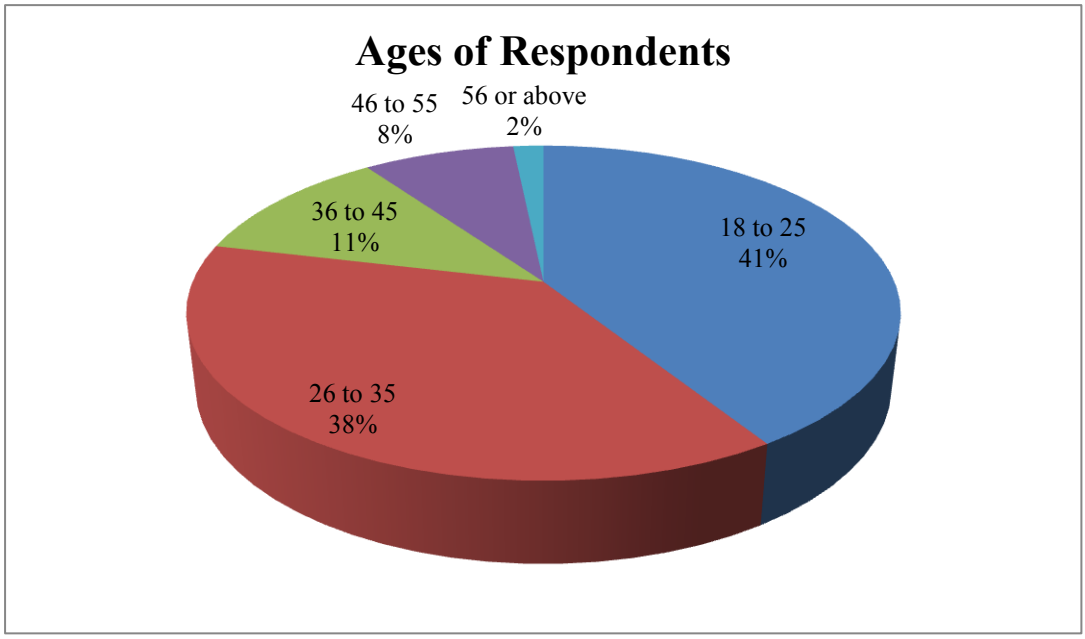

Figure 5.3 Ages of respondents

For the education level, 68% of respondents were degree holders, 16% of respondents with high school level, 10% were master and 6% with high diploma certificate. (Figure 5.4)

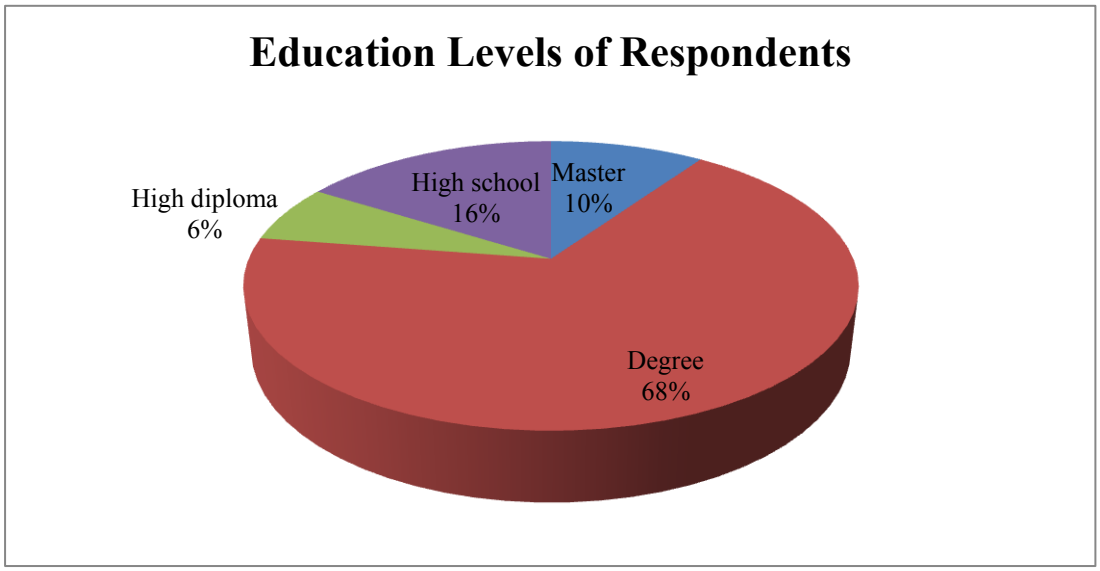

Figure 5.4 Education levels of respondents

For the years of experience in construction industry, 61% of respondents were from 0 to 5 years, 11% of respondents were from 6 to 10 years, 13% of respondents were from 11 to 15 years, 7% of respondents were from 16 to 20 years, 8% of respondents were from 21 to 30 years. (Figure 5.5)

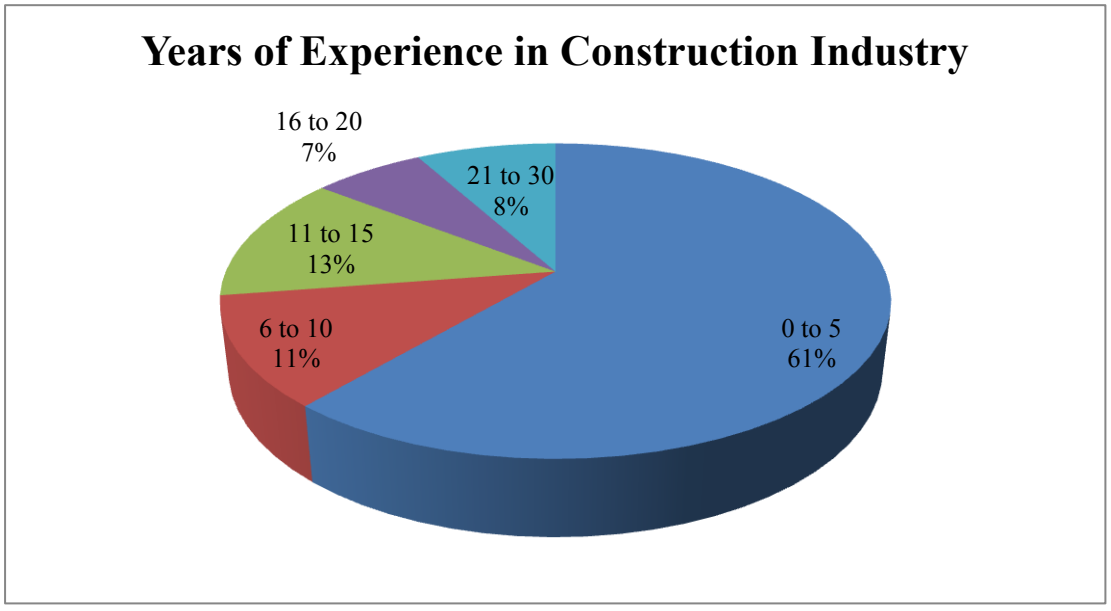

Figure 5.5 Years of experience in construction industry

In the survey, 40% of respondents have working in RMAA works while 60% of they did not have working experience in RMAA works. As the results, we can compare and analyze the result obtained from two groups of respondents.

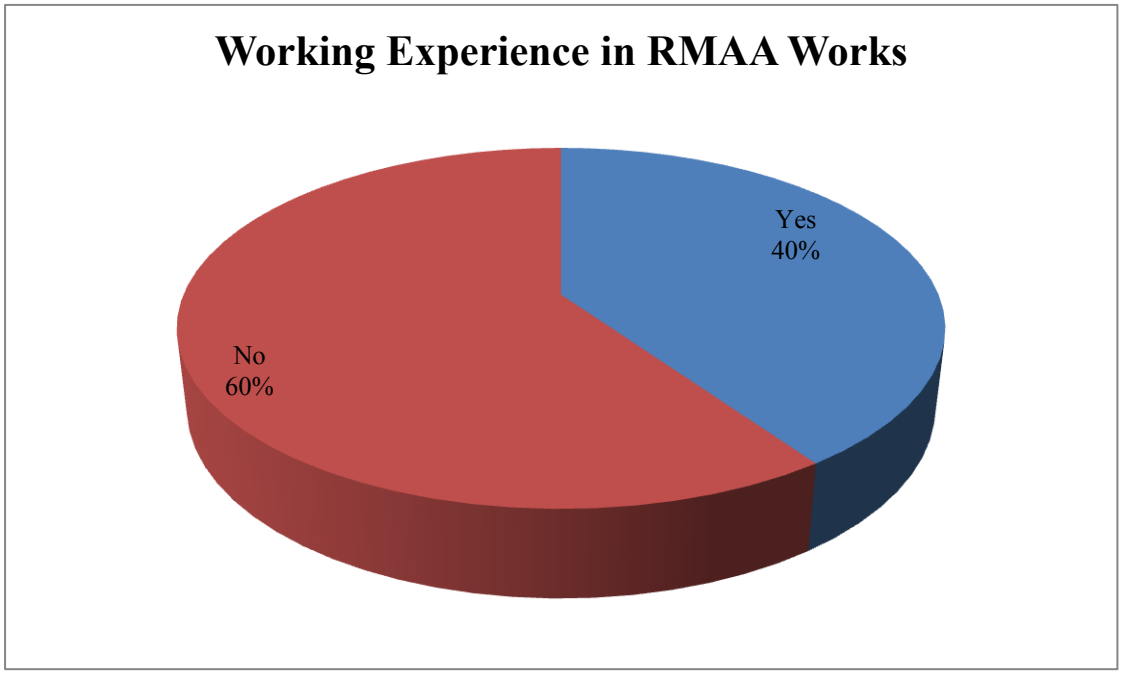

Figure 5.6 Working experience in RMAA works

5.3 Results of the RMAA Works Safety Survey

In the second section of the RMAA Works Safety Survey, it was divided into a total of 3 categories: causes of accidents (question 1), the safety attitudes and culture towards RMAA works (question 2 to 9), current policies implemented by the government and construction companies (question 10 to 15).

5.3.1 *Category 1 "Causes of Accidents occurred"*

"Low safety awareness of RMAA workers", "Insufficient safety training of RMAA workers for muti-tasks" and "Hurry to finish the work" were considered to be the major factors leading to RMAA accident. There were 27, 18 and 12 respondents voted respectively (Table 5.8(a)). On the other hand, "Hazard of work nature", "Poor housekeeping and congested working environment" and "Inadequate safety supervision" were not considered as the major factors causing RMAA accident. There were 15, 13 and 16 respondents voted respectively (Table 5.8(a)). The total and mean scores of rating with 8 causes of accidents were shown in table 5.7. It shows that the highest means score is "Low safety awareness of RMAA workers" while "Hazard of work nature" is the lowest. "Low safety awareness of RMAA workers is the major reason that RMAA works accident occurred" which is in line with the finding of Hon, et al. (2010) that the most important underlying causes of accidents in RMAA works is poor safety conscientiousness of RMAA workers. Surely, occurrence of accident should not be solely a single factor can explain.

Although the accident rate in construction was remained high in Hong Kong and construction industry was commonly known as a high hazard work, the practitioners respondents believed that the "Hazard of work nature" was not the main reason of

accidents. On the contrary, the voting of rank 1, "Low safety awareness of RMAA workers", is relatively significant, showing that most of the respondents believed that the worker with low safety awareness is the real major problem leading to accidents. From Table 5.8(b), it showed the detail data of the ranking in ascending order.

Causes of Accidents	Total scores of Rating	Mean scores of Rating	Ranking
Low safety awareness of RMAA workers	414	6.68	1
Insufficient safety training of RMAA workers for muti-tasks	333	5.37	2
Hurry to finish the work	306	4.94	3
Low safety awareness of small-medium sized contractors and property owners in RMAA works	272	4.39	4
Inadequate site safety planning and hazard assessment	252	4.06	5
Inadequate safety supervision	233	3.76	6
Poor housekeeping and congested working environment	220	3.55	7
Hazard of work nature	202	3.26	8

Table 5.7 Ranking of causes of accidents

*Note: Score of rating 8 for the most important reason of accidents occur; i.e. the least will be 1

Factors \ Rank	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**		**Total**
Inadequate safety supervision	4	1	7	8	9	**16**	11	6		62
Hurry to finish the work	8	10	**12**	8	8	4	4	8		62
Low safety awareness of RMAA workers	**27**	14	8	6	2	4	1	0		62
Inadequate site safety planning and hazard assessment	3	7	5	10	**13**	8	7	9		62
Insufficient safety training of RMAA workers for muti-tasks	11	**18**	8	3	8	2	6	6		62
Poor housekeeping and congested working environment	3	1	8	9	8	9	**13**	11		62
Low safety awareness of small-medium sized contractors and property owners in RMAA works	4	6	10	**13**	7	8	7	7		62
Hazard of work nature	2	5	4	5	7	11	**13**	**15**		62
Total	62	62	62	62	62	62	62	62		**Total**

Table 5.8(a): Ranking Distribution of causes of accidents

*Note: The values mean the number of votes
*For example, 27 in "Low safety awareness of RMAA workers" means 27 respondents vote "safety awareness of RMAA workers" in rank 1

Factors \ Rank	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**		**Final Rank**
Low safety awareness of RMAA workers	**27**	14	8	6	2	4	1	0		1
Insufficient safety training of RMAA workers for muti-tasks	11	**18**	8	3	8	2	6	6		2
Hurry to finish the work	8	10	**12**	8	8	4	4	8		3
Low safety awareness of small-medium sized contractors and property owners in RMAA works	4	6	10	**13**	7	8	7	7		4
Inadequate site safety planning and hazard assessment	3	7	5	10	**13**	8	7	9		5
Inadequate safety supervision	4	1	7	8	9	**16**	11	6		6
Poor housekeeping and congested working environment	3	1	8	9	8	9	**13**	11		7
Hazard of work nature	2	5	4	5	7	11	**13**	**15**		8

Table 5.8(b): Ranking Distribution of causes of accidents

*Note: The values mean the number of votes

*For example, 27 in ―Low safety awareness of RMAA workers" means 27 respondents vote ―safety awareness of RMAA workers" in rank 1

For the rank distribution of "Low safety awareness of RMAA workers", two groups of respondents‘ decisions were analyzed. They are with and without experience in RMAA works. It was shown that generally the overall trend was increased from rank 8 to 1. Both parties were also had similar trend. However, in precisely, data obtained from respondents with RMAA experience was more consistently ordered. They did not rank it from 5 to 8 while which was relatively random in without RMAA experience group from rank 3 to 8. (Figure 5.9)

Similar situation was found for the rank distribution of "Hazard of work nature”. (Figure 5.10)

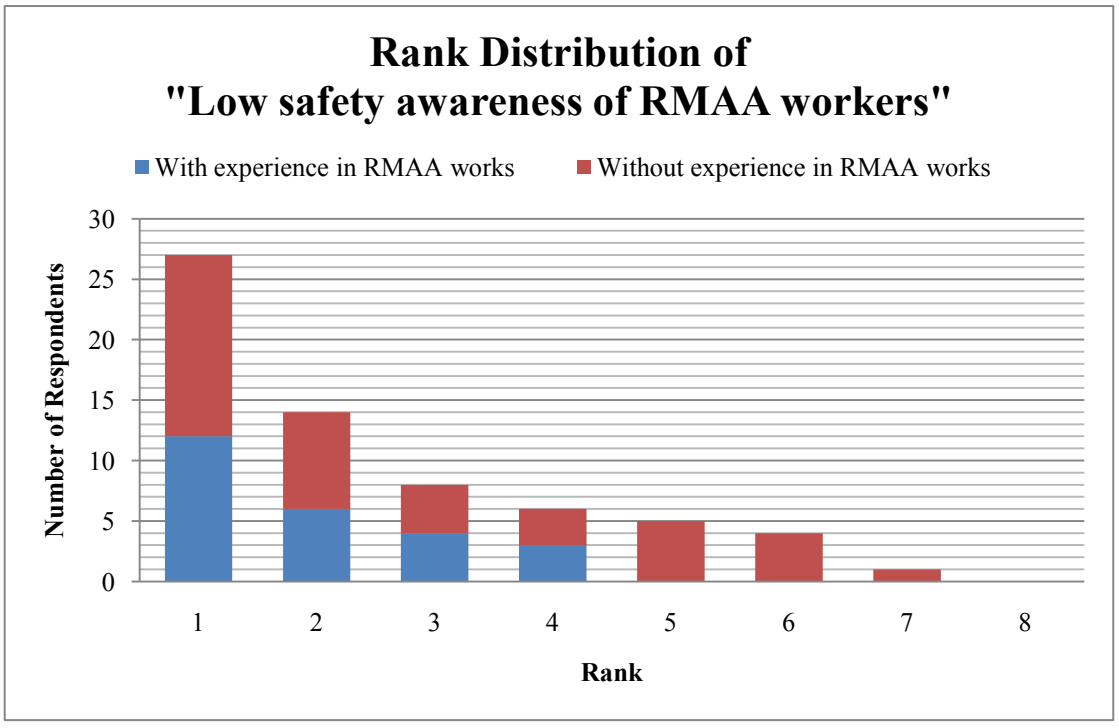

Figure 5.9 Rank Distribution of "Low safety awareness of RMAA workers"

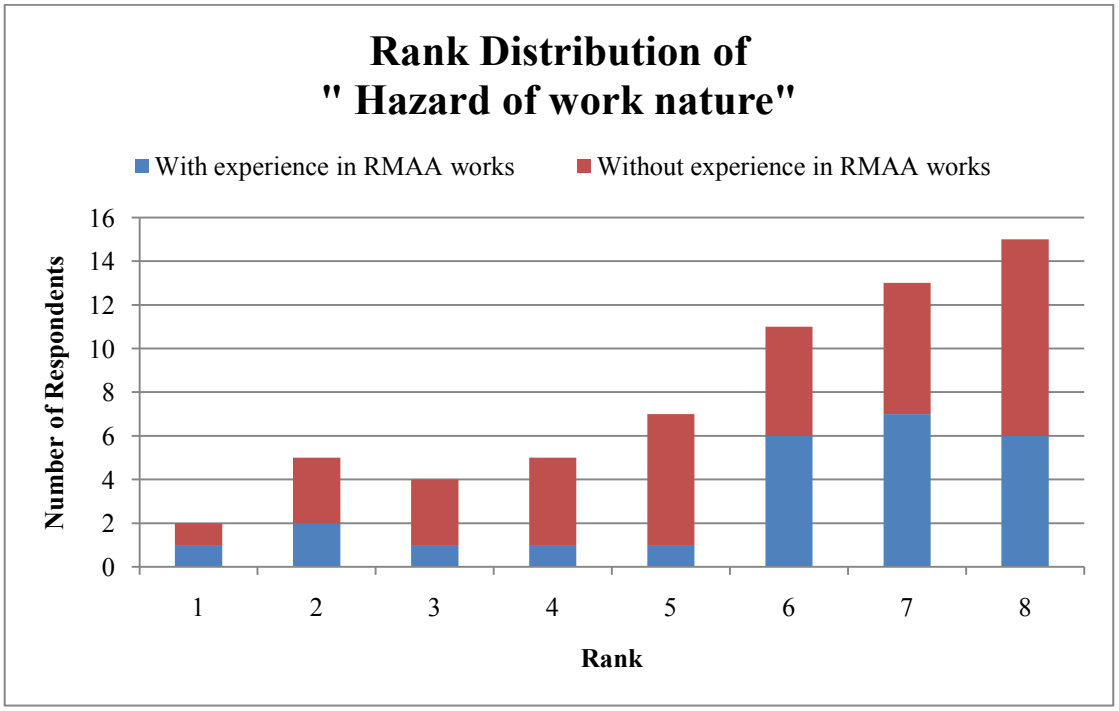

Figure 5.10 Rank Distribution of "Hazard of work nature"

5.3.2 ***Category 2 "Safety attitudes towards RMAA works"***

In this category, 8 questions were asked about the safety attitudes towards RMAA works. 24% of respondents' safety attitudes will be affected by their colleagues because of the peer pressure and 26% of respondents will be affected by their colleagues because they can manage a better relationship with them whereas there were 47% of respondents will not follow their colleagues as they have own personal safety expectation. The others are "depends on the condition" and "only have some influence". (refer to Figure 5.11)

59 (95%) and 51 (82%) respondents considered that main contractor and workers would be the responsible person when accident occurred in RMAA works respectively. Only 28 (45%) and 20 (32%) respondents thought that client/developer and government would be the responsible person when accident occurred in RMAA works

respectively. Two respondents added that foremen and safety officer would also responsible for the accident. (refer to Figure 5.12 and Table 5.13)

According to the respondent‘s reply, the result of concern factor during RMAA period was significant. ―Safety is the most concern factor, following is ―Quality" and ―Cost". ―Time" is the least concern factor during the construction. The total and mean scores of rating with 4 factors were shown in table 5.14. Therefore, it implied that practitioners placed safety to be the first place, the most important element of construction. (refer to Table 5.15(a) and 5.15(b))

To improve worker‘s safety attitudes towards RMAA works, 6 factors (Company policy/attitudes, Supervisor/Safety Officer's instructions, Legislation & Cope of Practices, Safety training, Heard a serious construction accident happened recently and Safety promotion) were examined. For the respondents with RMAA work experience, 60% of them thought that ―Heard a serious construction accident happened recently" was the most effective way to improve their safety attitudes. For the respondents without RMAA work experience, ―Company policy/attitudes", ―Supervisor/Safety Officer's instructions" and ―Heard a serious construction accident happened recently" were the major factors to improve their safety attitudes. (refer to Figure 5.16 and Table 5.17)

94% of respondents will report hazard to their supervisor or safety officer when they have discovered it. 55% will report because it was the responsibility and 40% because the hazard affected his and others personal safety. Only 5 % of respondents will not

report the hazard. (refer to Figure 5.18)

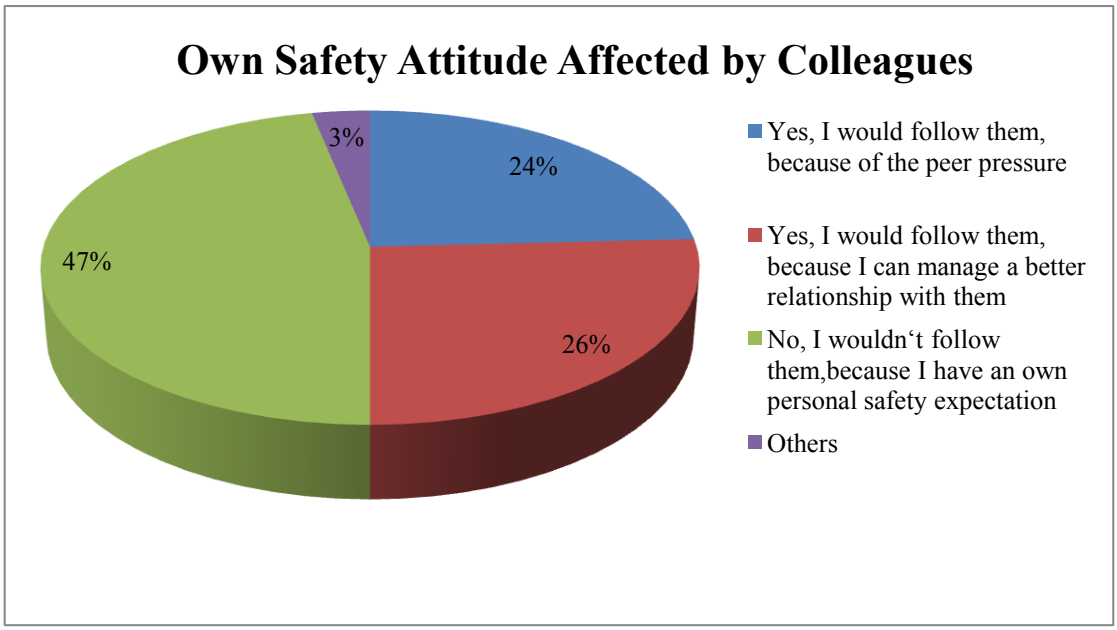

Figure 5.11 Own safety attitudes affected by colleagues

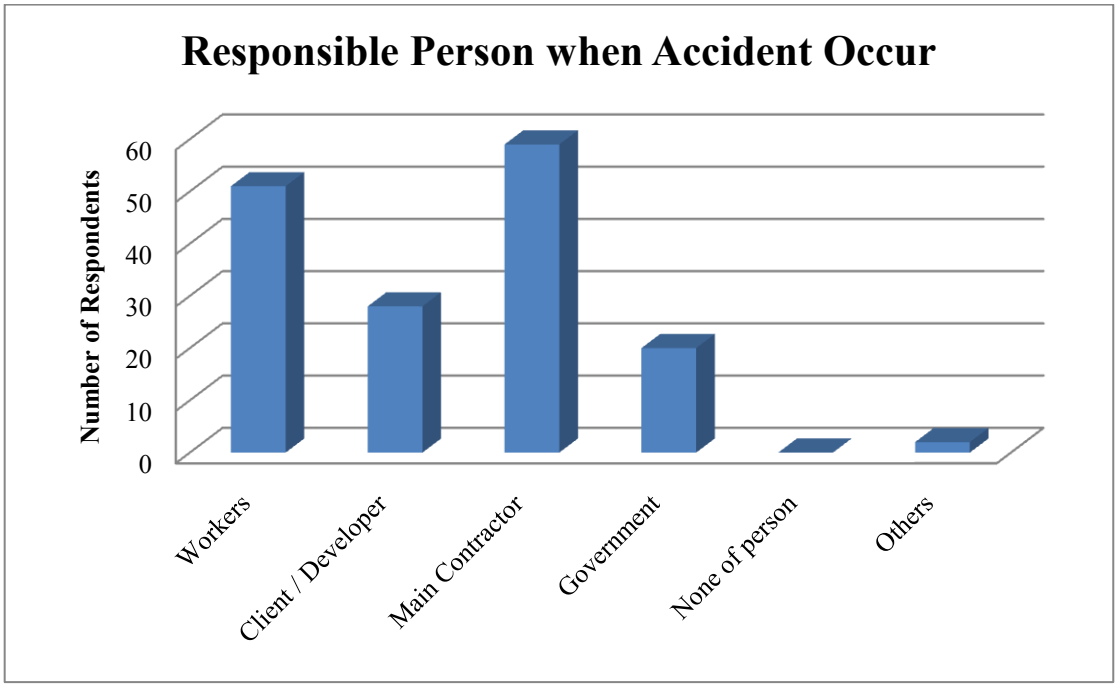

Figure 5.12 Responsible person when accident occur

Responsible Person when Accident Occur		
	No. of Respondents	% of Respondents
Workers	51	82%
Client / Developer	28	45%
Main Contractor	59	95%
Government	20	32%
None of person	0	0%
Others	2	3%

Table 5.13 Responsible person when accident occurs

Concern Factors	Total scores of Rating	Mean scores of Rating	Ranking
Safety	217	3.50	1
Quality	154	2.48	2
Cost	141	2.27	3
Time	108	1.74	4

Table 5.14 Ranking of most concern factor during RMAA period

*Note: Score of rating 4 for the most concern factor; i.e. the least will be 1

Factors \ Rank	**1**	**2**	**3**	**4**		**Total**
Time	3	10	17	**32**		62
Cost	9	13	**26**	14		62
Quality	8	**29**	10	15		62
Safety	**42**	10	9	1		62
Total	62	62	62	62		**Total**

Table 5.15(a) Ranking distribution of most concern factor during RMAA period

Factors \ Rank	**1**	**2**	**3**	**4**		**Final Rank**
Safety	**42**	10	9	1		**1**
Quality	8	**29**	10	15		**2**
Cost	9	13	**26**	14		**3**
Time	3	10	17	**32**		**4**
Total	62	62	62	62		**Total**

Table 5.15(b) Ranking distribution of most concern factor during RMAA period

*Note: The values mean the number of votes

*For example, 42 in –Safety" means 42 respondents vote –Safety" in rank 1

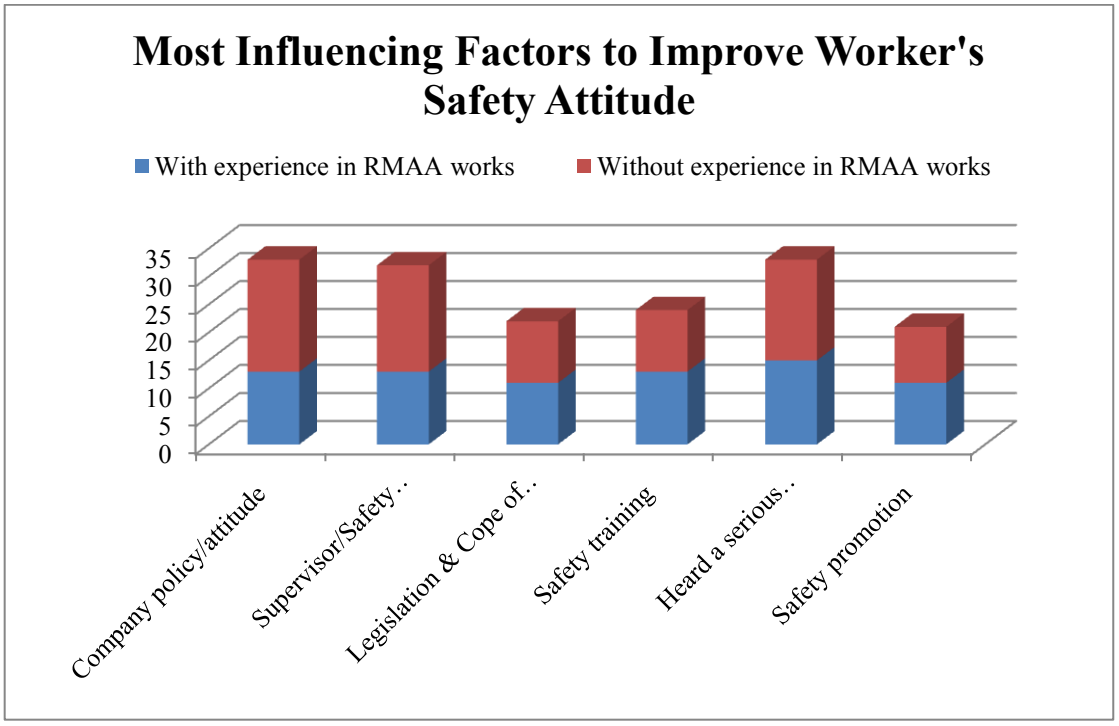

Figure 5.16 Most influencing factors to improve safety attitudes

Most Influencing Factors to Improve Worker's Safety Attitudes

	With experience in RMAA works		Without experience in RMAA works		Total	
	No. of Respondents	% of Respondents	No. of Respondents	% of Respondents	No. of Respondents	% of Respondents
Company policy/attitudes	13	52%	20	54%	33	53%
Supervisor/Safety Officer's instructions	13	52%	19	51%	32	52%
Legislation & Cope of Practices	11	44%	11	30%	22	35%
Safety training	13	52%	11	30%	24	39%
Heard a serious construction accident happened recently	15	60%	18	49%	33	53%
Safety promotion	11	44%	10	27%	21	34%

Table 5.17 Most influencing factors to improve safety attitudes

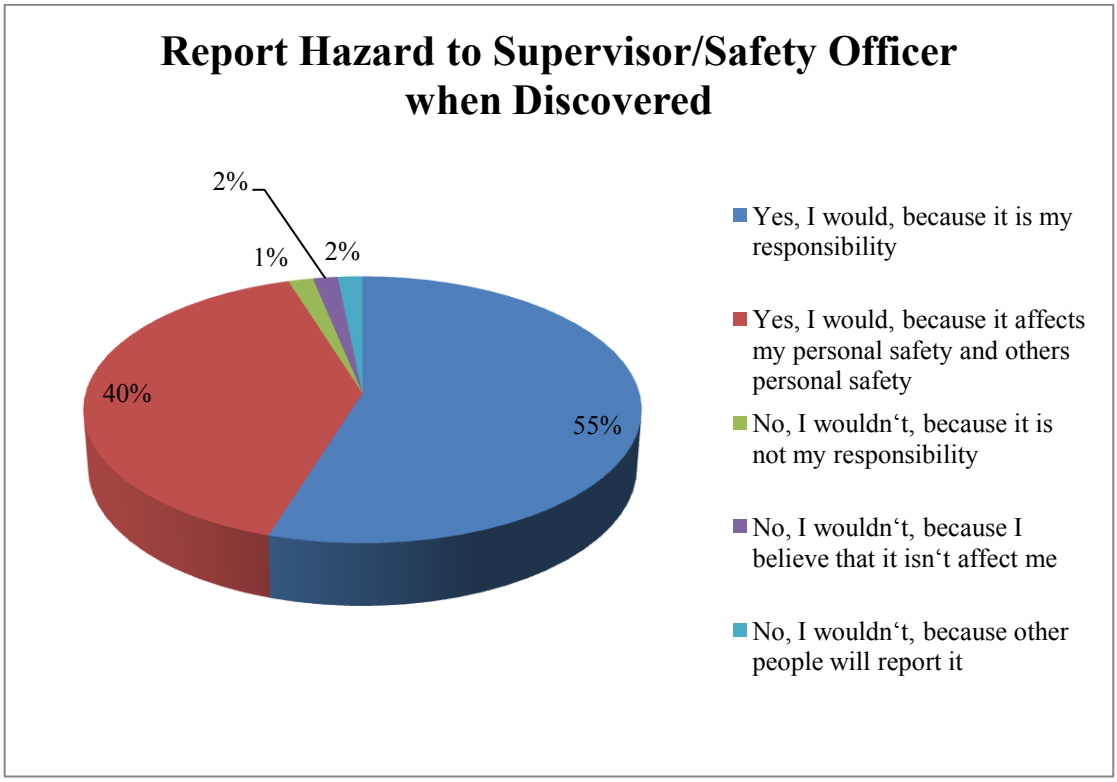

Figure 5.18 Report hazard to their supervisor/safety officer when discovered

Following are results of three statements about safety culture and attitudes; the respondents' view are sorted into "Strongly agree", "Agree", "Uncertain", "Disagree" and "Strongly disagree" for item groups.

For the statement, "RMAA Construction accidents are unpreventable", respondents with RMAA work experience had different opinion to respondents without RMAA work experience. Together 52% of them were at disagree and strongly disagree side of the statement and only 24% were at agree and strongly agree side. On the contrary, respondents without RMAA work experience had a total 44% agree and strongly agree the statement and only 26% disagree and strongly disagree it. (refer to Figure 5.19 and Table 5.20)

For the statement, "Safety of RMAA works are overlooked comparing to that of general construction site", both groups, with and without experience in RMAA, had a

positive response with 44% and 59% agree respectively. (refer to Figure 5.21 and Table 5.22)

For the statement, "Risk and dangerous exposing by workers in RMAA works are less than that of general construction site", two groups again had different opinion. 52% of respondents with RMAA experience disagree the statement while 43% of respondents without RMAA experience agree it. (refer to Figure 5.23 and Table 5.24)

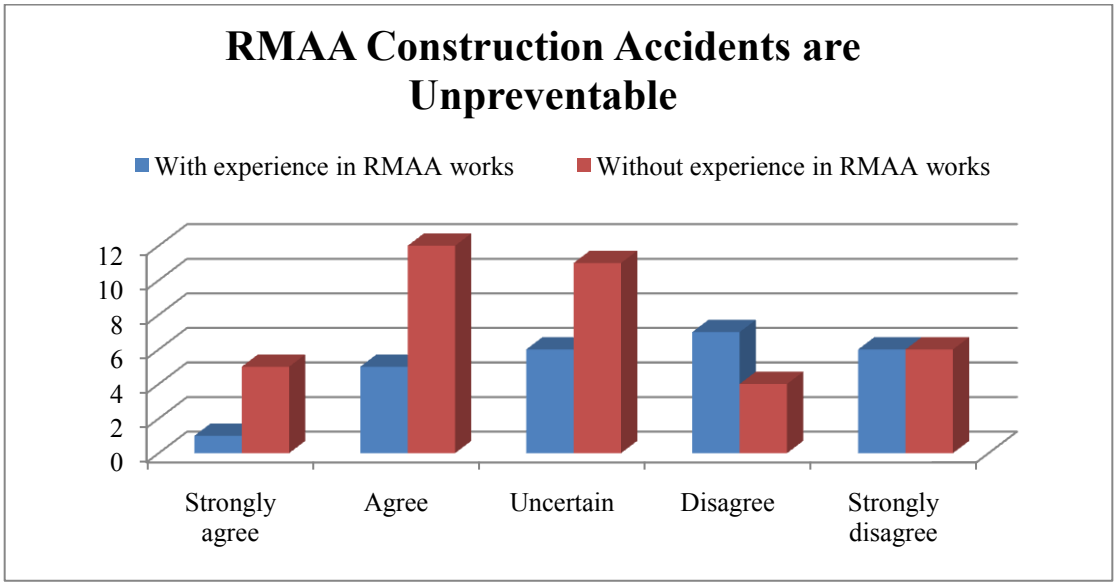

Figure 5.19 Construction accidents are unpreventable

RMAA Construction Accidents are Unpreventable				
	With experience in RMAA works		Without experience in RMAA works	
	No. of Respondents	% of Respondents	No. of Respondents	% of Respondents
Strongly agree	1	4%	5	13%
Agree	5	20%	12	31%
Uncertain	6	24%	11	30%
Disagree	7	28%	4	10%
Strongly disagree	6	24%	6	16%

Table5.20 Construction accidents are unpreventable

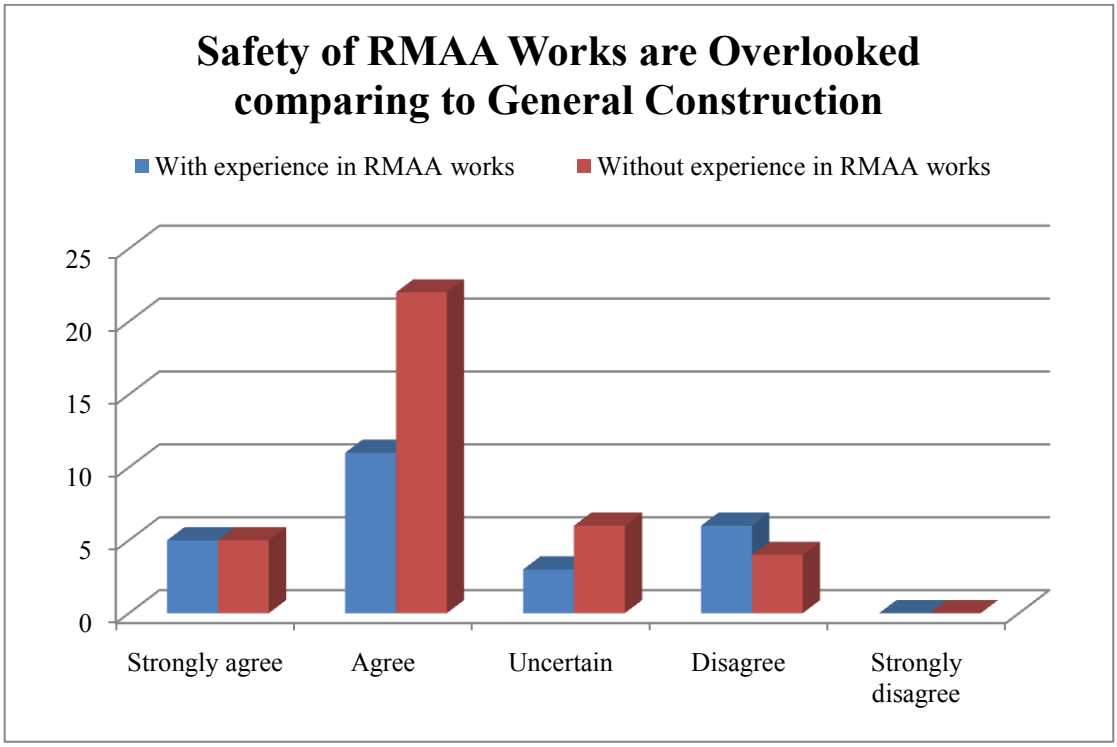

Figure 5.21 Safety of RMAA works are overlooked comparing to general construction

Safety of RMAA Works are Overlooked comparing to General Construction				
	With experience in RMAA works		Without experience in RMAA works	
	No. of Respondents	% of Respondents	No. of Respondents	% of Respondents
Strongly agree	5	20%	5	14%
Agree	11	44%	22	59%
Uncertain	3	12%	6	16%
Disagree	6	24%	4	11%
Strongly disagree	0	0%	0	0%

Table 5.22 Safety of RMAA works are overlooked comparing to general construction

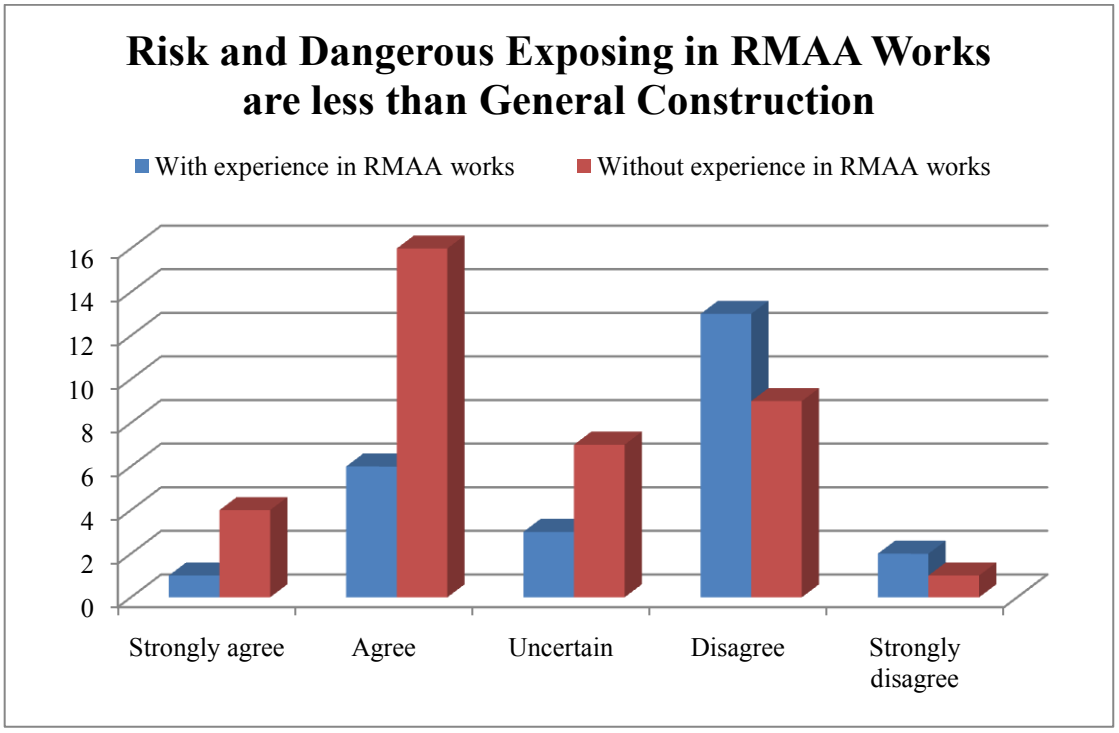

Figure 5.23 Risk and dangerous exposing in RMAA works are less than general construction

Risk and Dangerous Exposing in RMAA Works are Less than General Construction				
	With experience in RMAA works		Without experience in RMAA works	
	No. of Respondents	% of Respondents	No. of Respondents	% of Respondents
Strongly agree	1	4%	4	11%
Agree	6	24%	16	43%
Uncertain	3	12%	7	19%
Disagree	13	52%	9	24%
Strongly disagree	2	8%	1	3%

Table 5.24 Risk and dangerous exposing in RMAA works are less than general construction

5.3.3 *Category 3 "Current policies implemented by government and construction companies"*

In this category, 6 questions were asked about the current policies implemented by the government and construction companies. 69% and 61% of respondents considered Occupational Safety and Health Council and Labour Department paid enough concern to the RMAA works safety respectively. (refer to Figure 5.25 and Table 5.26)

53% of respondents thought the current Ordinance and Regulations related to construction safety are deterrent enough. However, 47% of them thought the opposite as it cannot proceed adequately in current RMAA work (28%) and the punishment is insufficient (19%). (refer to Figure 5.27)

The major limitation to existing format towards RMAA work safety management is "Workers' behavior and attitudes" (77%), the second high is "Company policy/attitudes" (50%), and following is "Industry background" (47%), "Legislation & Cope of Practices" (44%), "Society Culture" (34%) and "Work nature" (34%). (refer to Figure 5.28 and Table 5.29)

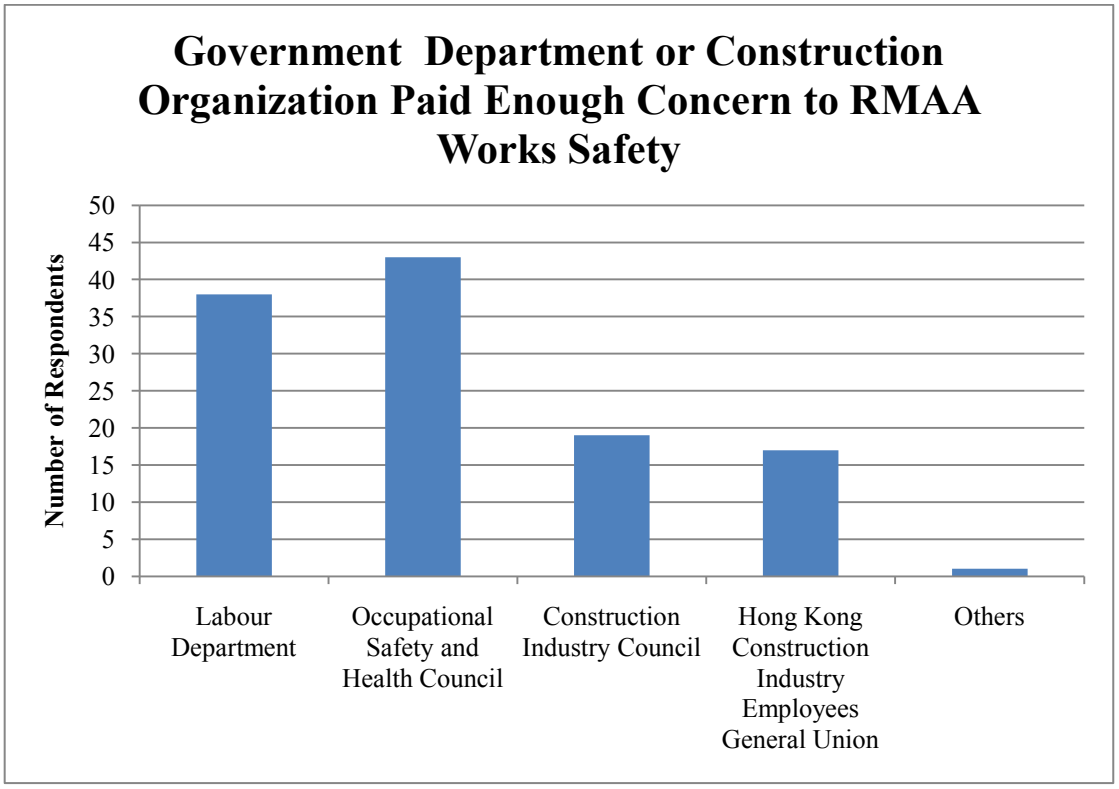

Figure 5.25 Government department or construction organization paid enough concern to RMAA works safety

Government Department or Construction Organization Paid Enough Concern to RMAA Works Safety		
	No. of Respondents	% of Respondents
Labour Department	38	61%
Occupational Safety and Health Council	43	69%
Construction Industry Council	19	31%
Hong Kong Construction Industry Employees General Union	17	27%
Others	1	2%

Table 5.26 Government department or construction organization paid enough concern to RMAA works safety

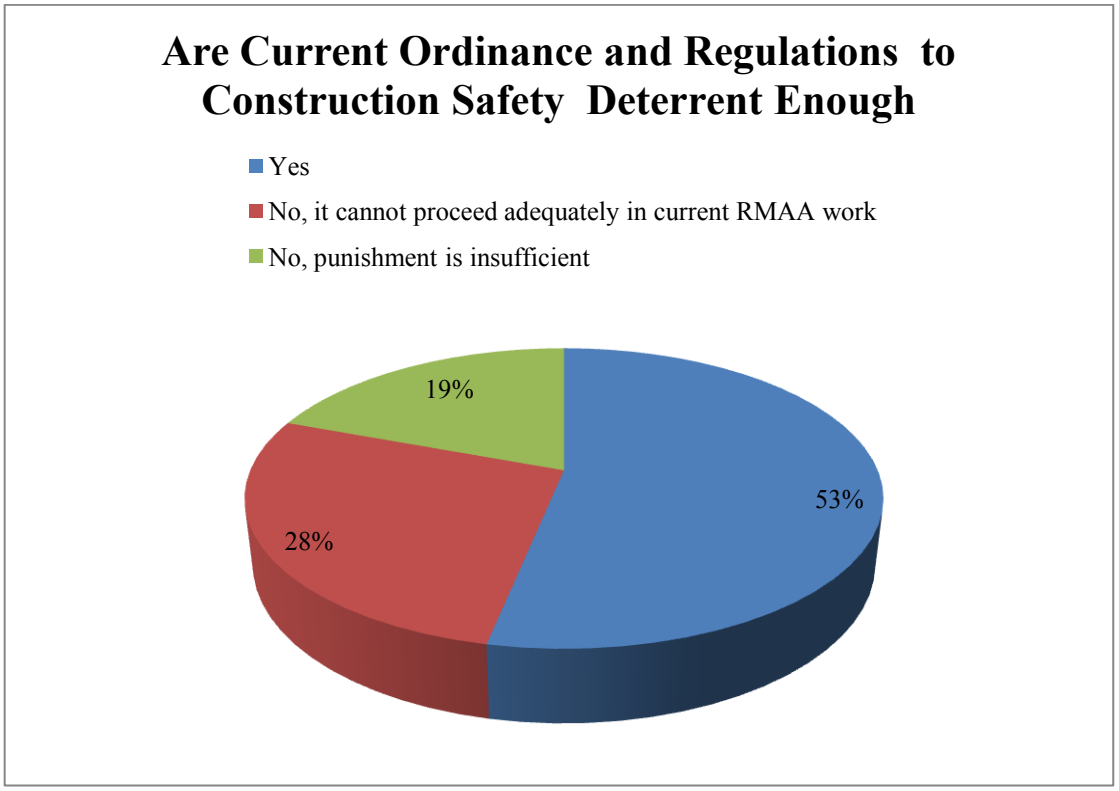

Figure 5.27 Are current ordinance and regulations to construction safety deterrent enough

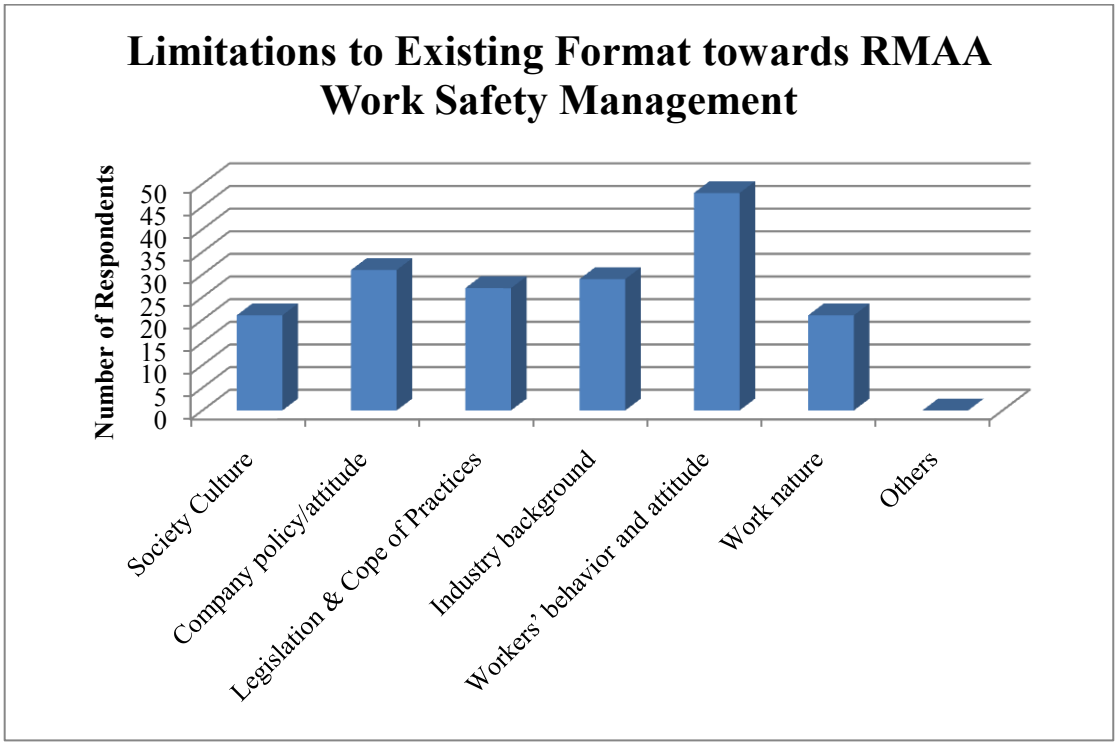

Figure 5.28 Limitations to existing format towards RMAA work safety management

Limitations to Existing Format towards RMAA Work Safety Management		
	No. of Respondents	% of Respondents
Society Culture	21	34%
Company policy/attitudes	31	50%
Legislation & Cope of Practices	27	44%
Industry background	29	47%
Workers‘ behavior and attitudes	48	77%
Work nature	21	34%
Others	0	0%

Table 5.29 Limitations to existing format towards RMAA work safety management

Respondents provided that 69% of them had adequate personal safety equipment, safety induction/seminar (66%) and safety training course (63%). Some of their companies will provide award on well done workers on safety aspect (47%), safety orientation (29%) and regular feedback collection from worker (23%). However, there were still 6% of respondents claimed that the companies did not provide anything on safety aspect. (refer to Figure 5.30 and Table 5.31)

72% of respondents believed that training and facilities provide by their companies are useful in two reason, ―provide an adequate knowledge on site safety" (51%) and ―enhance the current safety culture and the degree of safety awareness" (21%). But 12% of respondents thought it is useless because it only provide a fundamental knowledge on site safety. 8% of respondents even thought accident is unpreventable and one claimed that accident cannot be avoided but it can be reduced by training and facilities. 4 respondents said the companies did not provide training and facilities. (refer to Figure 5.32)

Over 60% of Respondents thought that companies should provide safety induction/seminar (63%), adequate personal safety equipment (60%), and safety training course (69%) which was coincidence with the resources that companies had been provided. Besides, safety orientation (50%) and regular feedback collection from worker (50%) were also demanded by the respondents. Also, 40% of respondents thought safety orientation should be provided. (refer to Figure 5.33 and Table 5.34)

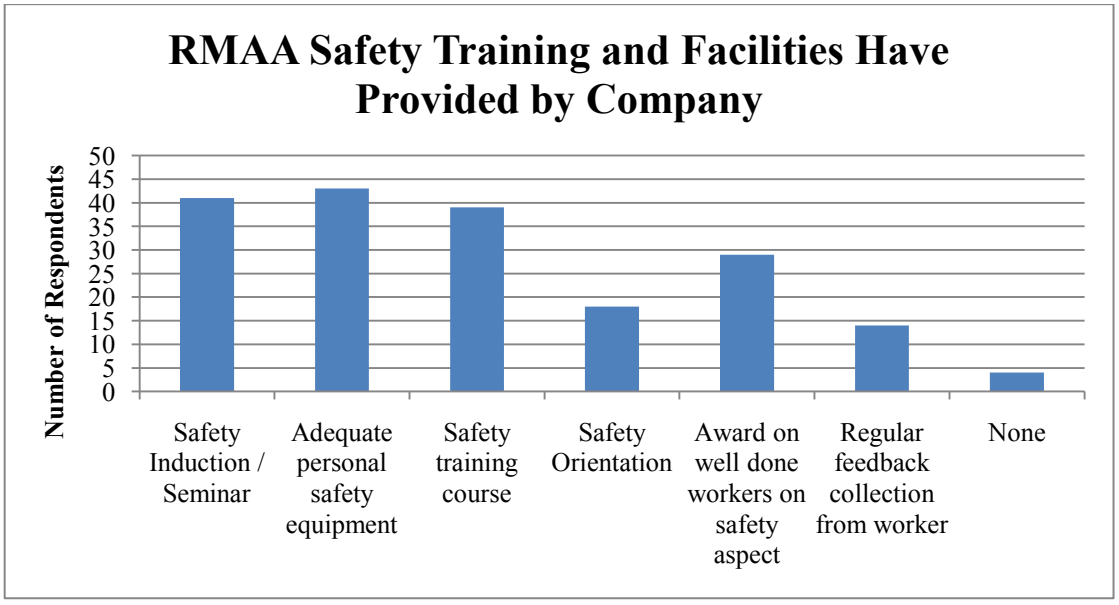

Figure 5.30 RMAA safety training and facilities provided by company

RMAA Safety Training and Facilities Have Provided by Company		
	No. of Respondents	% of Respondents
Safety Induction / Seminar	41	66%
Adequate personal safety equipment	43	69%
Safety training course	39	63%
Safety Orientation	18	29%
Award on well done workers on safety aspect	29	47%
Regular feedback collection from worker	14	23%
None	4	6%

Table 5.31 RMAA safety training and facilities provided by company

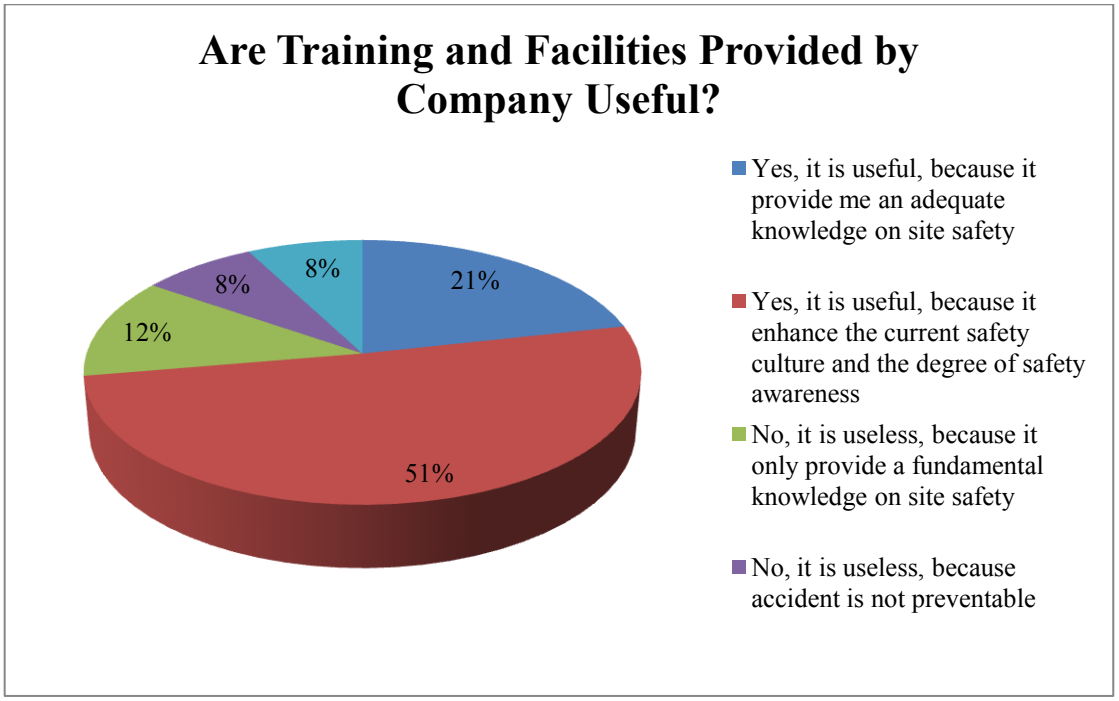

Figure 5.32 Are training and facilities provided by company useful?

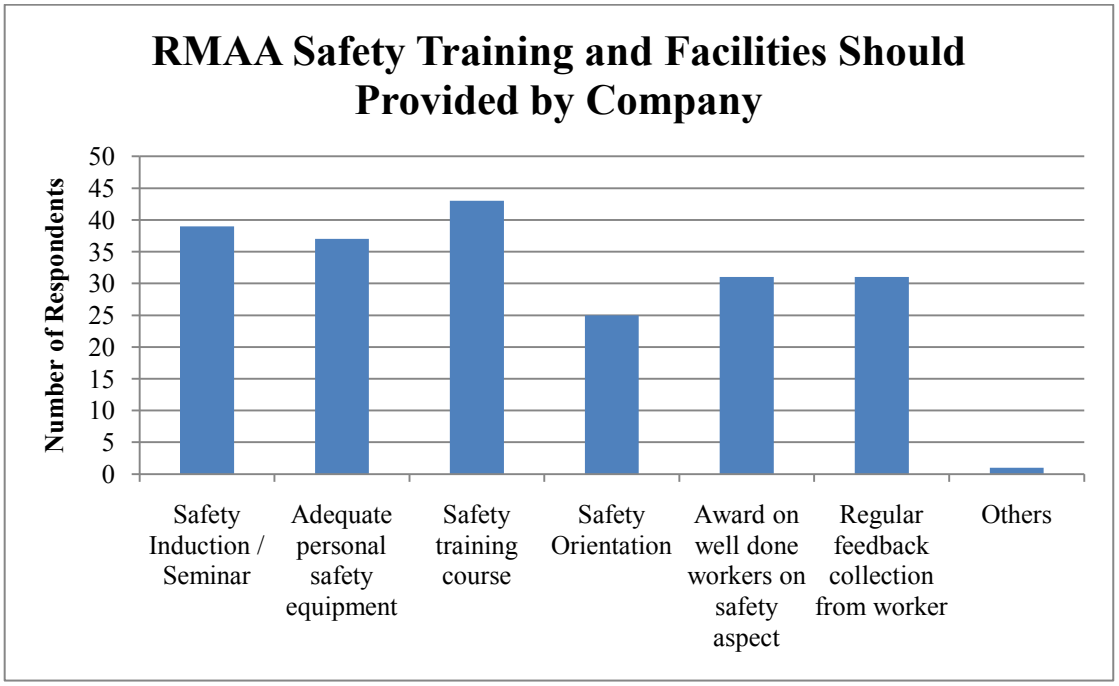

Figure 5.33 RMAA safety training and facilities provided by company

RMAA Safety Training and Facilities Should Provided by Company		
	No. of Respondents	% of Respondents
Safety Induction / Seminar	39	63%
Adequate personal safety equipment	37	60%
Safety training course	43	69%
Safety Orientation	25	40%
Award on well done workers on safety aspect	31	50%
Regular feedback collection from worker	31	50%
Others	1	2%

Table 5.34 RMAA safety training and facilities provided by company

CHAPTER 6

Statistical Analysis

6.1 Introduction

6.2 Reliabilities of Survey

6.3 Intercorrelations between the Questions

6.4 Independent Samples T-test Analysis

CHAPTER 6

Statistical Analysis

6.1 Introduction

This chapter conducted independent analysis and comparison on the relationship of result of survey, by focusing on the questions with single answer. Firstly, the reliability of Survey will be examined by using Coefficient Alphas. Secondly, the intercorrelations between each question will be analyzed by using Bivariate Analysis (Pearson Correlations, r). Finally, Independent Samples T-test will be used to analyze the divergences of safety attitudes of different groups. To facilitate the analysis, the same direction answer, for example both answer choosing yes but with different reasons, will be grouped to be the same group.

6.2 Reliabilities of Survey

In the survey, besides the other two types of questions (more than one answer question, ranking question), there were 7 questions with single answer format and they conducted the reliability analysis. The coefficient alpha (Cronbach‘s alpha) is used to measure the internal-consistency reliability. This measure is derived from the correlations of each item with each other item. Alpha ranges from 0 to 1, with 0 meaning complete unreliability (the measure produces scores that are effectively unrepeatable random numbers) and 1 meaning perfect reliability (no random error component whatever; all the items measure exactly the same thing) (Judd, et al., 1991).

The alpha value of the category of Safety attitudes towards RMAA works (q2, 6, 7, 8 & 9) was in an acceptable level ($\alpha = 0.557$). However, the alpha value of category of Current policies implemented by government and construction companies (q11 &14) was relatively low and unacceptable ($\alpha = 0.336$). (refer to Table 6.1)

Reliability Statistics		
Category	Cronbach's Alpha	No. of Items
Safety attitudes towards RMAA works	0.557	5
Current policies implemented by government and construction companies	0.336	2

Table 6.1 Reliability Statistics of survey

Since other types of question in the survey (more than one answer question, ranking question) were not included in the analysis, the number of question in category of Current policies implemented by government and construction companies being analysis is limited. As a larger range of samples on the measured factor among the individuals being tested leads to higher reliability (Judd, et al., 1991). The result of not high enough reliability can be improved by increasing sufficient numbers of questions for the reliability analysis.

6.3 Intercorrelations between the Questions

The Pearson's Correlation (r) is one kind of Bivariate Analysis used when both variable are at least approximately normally distributed (Morgan, et al., 2001). This types of correlation can vary from –1.0 (a perfect negative relationship or association) through 0.0 (no correlation) to +1.0 (a perfect positive correlation), whereas +1 and –1 are equally high or strong, but they lead to different interpretations. The flag "**"/ "*" indicates the correlation coefficients that are statistically significant in the corresponding levels, so that they can be identified quickly.

6.3.1 *Relationship between Ages and "Safety Attitudes Influenced by Colleague"*

According to Table 6.2, ages was positively and statistically correlated with safety attitudes influenced by colleague [$r(62)=0.286^{*}, p<0.05$]. This means that younger practitioners's safety attitudes is easier to be affected by colleague, i.e. older practitioners's safety attitudes is less easy to be affected by colleague.

6.3.2 *Relationship between Ages and Attitudes towards the Statement "RMAA Construction Accidents are Unpreventable"*

According to Table 6.2, ages was positively and statistically correlated with the attitudes towards the statement "RMAA Construction accidents are unpreventable [$r(45)=0.307^{*}, p<0.05$]. This means younger practitioners believe that construction accidents are unpreventable, i.e. older practitioners believe that construction accidents are preventable.

Remark: The flag "**"/ "*" indicates the correlation coefficients that are statistically significant in the corresponding levels

The results are in line with the previous findings. Siu, et al. (2003) showed some older workers do indeed have more positive attitudes toward safety, compared with younger workers. Also, some research documented that age and accident rates are negatively related. (Frone, 1998; Kingsma, 1994; Stalneker, 1998; Topf, 2000).

Correlations

		Ages	Influenced By Colleague	RMAA Construction Accidents are Unpreventable
Ages	Pearson Correlation	1	.286*	.307*
	Sig. (2-tailed)		.024	.040
	N	62	62	45
Influenced By Colleague	Pearson Correlation	.286*	1	.024
	Sig. (2-tailed)	.024		.877
	N	62	62	45
RMAA Construction Accidents are Unpreventable	Pearson Correlation	.307*	.024	1
	Sig. (2-tailed)	.040	.877	
	N	45	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.2 Relationship between Ages and Safety Attitudes Influenced by Colleague, Relationship between Ages and Attitudes towards the Statement –RMAA Construction accidents are unpreventable"

6.3.3 ***Relationship between Years of Experience and "Safety Attitudes Influenced by Colleague"***

According to Table 6.3, years of experience in construction industry was positively and statistically correlated with safety attitudes influenced by colleague [$r(62)=0.254^*$, $p<0.05$] since years of experience was highly positively correlated with age. Therefore, in the findings, there are some similarities with ages. This means that less experienced practitioners's safety attitudes is easier to be affected by colleague, i.e. more experienced practitioners's safety attitudes are less easy to be

affected by colleague.

6.3.4 ***Relationship between Years of Experience and Attitudes towards the Statement "RMAA Construction Accidents are Unpreventable"***

Also, according to Table 6.3, years of experience in construction industry was positively and statistically correlated with the attitudes towards the statement –RMAA Construction accidents are unpreventable [$r(45)=0.329^*$, $p<0.05$]. This means less experienced practitioners believe that construction accidents are unpreventable, i.e. more experienced practitioners believe that construction accidents are preventable. It shows that the safety attitudes will change according to the years of experience in construction.

Correlations

		Years of Experience	Influenced By Colleague	RMAA Construction Accidents are Unpreventable
Years of Experience	Pearson Correlation	1	.254*	.329*
	Sig. (2-tailed)		.047	.027
	N	62	62	45
Influenced By Colleague	Pearson Correlation	.254*	1	.024
	Sig. (2-tailed)	.047		.877
	N	62	62	45
RMAA Construction Accidents are Unpreventable	Pearson Correlation	.329*	.024	1
	Sig. (2-tailed)	.027	.877	
	N	45	45	45

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.3 Relationship between Years of experience and Safety Attitudes Influenced by Colleague, Relationship between Years of experience and Attitudes towards the Statement –RMAA Construction accidents are unpreventable"

6.3.5 ***Relationship between Years of Experience and Attitudes towards the Statement "RMAA Risk Less than General Construction"***

According to Table 6.4, years of experience was positively and statistically correlated with the attitudes towards the statement "Risk and dangerous in RMAA is less than general construction" [$r(52)=0.280^*$, $p<0.05$]. This means less experienced practitioners think the risk and dangerous exposing by workers in RMAA works are less than that of general construction site, i.e. more experienced practitioners think the risk and dangerous exposing by workers in RMAA works are not less than that of general construction site. Generally speaking, the more experience practitioners is more familiar to construction industry. Then, their opinions are more reliable. Therefore, it can assume that RMAA risk and dangerous in RMAA is not less than that of general construction.

6.3.6 ***Relationship between Years of Experience and Attitudes towards the Statement "Training is Useful"***

According to Table 6.4, years of experience was negatively and statistically correlated with the attitudes towards the statement "Training and facilities provided by company is useful" [$r(57)=-0.291^*$, $p<0.05$]. This means less experienced practitioners think that training and facilities provided by company is not useful, i.e. more experienced practitioners think that training and facilities provided by company is useful.

It is an interesting finding. The less experience practitioners probably have less job knowledge, training and skills. Actually they should be provided more training. However, they do not think that the safety training and facilities provided by company is useful comparing to those with more experience. It reflects the divergence of safety

attitudes with years of experience in construction.

Correlations

		Years of Experience	RMAA Risk Less than General Construction	Training is Useful
Years of Experience	Pearson Correlation	1	.280*	-.291*
	Sig. (2-tailed)		.044	.028
	N	62	52	57
RMAA Risk Less than General Construction	Pearson Correlation	.280*	1	-.129
	Sig. (2-tailed)	.044		.376
	N	52	52	49
Training is Useful	Pearson Correlation	-.291*	-.129	1
	Sig. (2-tailed)	.028	.376	
	N	57	49	57

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.4 Relationship between Years of experience and Attitudes towards the Statement "RMAA risk less than general construction", Relationship between Years of experience and Attitudes towards the Statement "Training is useful"

6.3.7 ***Relationship between RMAA Work Experience and Attitudes towards the Statement "RMAA Construction Accidents are Unpreventable"***

According to Table 6.5, it shows "with RMAA work experience" was negatively and statistically correlated with the attitudes towards the statement "RMAA Construction accidents are unpreventable" [$r(45)=-0.296^*$, $p<0.05$]. This means that practitioners with RMAA experience believe RMAA construction accidents are preventable, i.e. practitioners without RMAA experience believe RMAA construction accidents are unpreventable.

6.3.8 ***Relationship between RMAA Work Experience and Attitudes towards the Statement "RMAA Risk Less than General Construction"***

According to Table 6.5, it shows "with RMAA work experience" was negatively and statistically correlated with the attitudes towards the statement "Risk and dangerous in RMAA is less than general construction" [$r(52=-0.345^*, p<0.05$]. This means that practitioners with RMAA experience believe RMAA risk and dangerous exposing by workers in RMAA works are not less than that of general construction site, i.e. practitioners without RMAA experience believe RMAA risk and dangerous exposing by workers in RMAA works are less than that of general construction site.

This can assume that there is a misunderstanding to practitioners without RMAA experience. They may think RMAA project generally smaller than general construction and the job nature is simpler, thus think that the risk is less than that of general construction. But practitioners with RMAA experience oppose this statement. This implies that practitioners without RMAA experience overlook RMAA works risk comparing to general construction work, while practitioners with RMAA experience does not. With RMAA experience practitioners are in line with more experience practitioners thinks that RMAA risk and dangerous in RMAA are not less than that of general construction.

Correlations

		RMAA experience	RMAA Construction Accidents are Unpreventable	RMAA Risk Less than General Construction
RMAA experience	Pearson Correlation	1	-.296*	-.345*
	Sig. (2-tailed)		.048	.012
	N	62	45	52
RMAA Construction Accidents are Unpreventable	Pearson Correlation	-.296*	1	.224
	Sig. (2-tailed)	.048		.190
	N	45	45	36
RMAA Risk Less than General Construction	Pearson Correlation	-.345*	.224	1
	Sig. (2-tailed)	.012	.190	
	N	52	36	52

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.5 Relationship between RMAA work experience and Attitudes towards the Statement "RMAA construction accidents are unpreventable", Relationship between RMAA work experience and Attitudes towards the Statement "RMAA risk less than general construction"

6.3.9 ***Relationship between "Safety Attitudes Influenced by Colleague" and Attitudes towards the Statement "RMAA Risk Less than General Construction"***

According to Table 6.6, it shows "Safety attitudes influenced by colleague" was positively and statistically correlated with the attitudes towards the statement "Risk and dangerous in RMAA is less than general construction" [$r(52=0.384^{**}, p<0.01$]. This means that the practitioners, whom safety attitudes would be influenced by colleague, think that RMAA risk and dangerous exposing by workers in RMAA works are less than that of general construction site, i.e. The practitioners, whom safety attitudes would not be influenced by colleague, think that RMAA risk and dangerous exposing by workers in RMAA works are not less than that of general

construction site.

Correlations

		Influenced by Colleague	RMAA Risk Less than General Construction
Influenced by Colleague	Pearson Correlation	1	.384**
	Sig. (2-tailed)		.005
	N	62	52
RMAA Risk Less than General Construction	Pearson Correlation	.384**	1
	Sig. (2-tailed)	.005	
	N	52	52

**. Correlation is significant at the 0.01 level (2-tailed).

Table 6.6 Relationship between "Safety Attitudes Influenced by Colleague" and Attitudes towards the Statement "RMAA Risk Less than General Construction"

6.3.10 ***Relationship between Attitudes towards the Statement "RMAA Safety are Overlooked comparing to General Construction" and "RMAA Risk Less than General Construction"***

According to Table 6.7, it shows attitudes towards the statement of "Safety of RMAA works are overlooked comparing to general construction site" was positively and statistically correlated with the statement "Risk and dangerous in RMAA is less than general construction" [$r(45)=0.357^{*}, p<0.05$]. This means the practitioners think risk and dangerous in RMAA works are less than general construction is correlated to safety are overlooked comparing to general construction.

Correlations

		RMAA Safety are Overlooked comparing to General Construction	RMAA Risk Less than General Construction
RMAA Safety are Overlooked comparing to General Construction	Pearson Correlation	1	.357*
	Sig. (2-tailed)		.016
	N	53	45
RMAA Risk Less than General Construction	Pearson Correlation	.357*	1
	Sig. (2-tailed)	.016	
	N	45	52

*. Correlation is significant at the 0.05 level (2-tailed).

Table 6.7 Relationship between Attitudes towards the Statement "RMAA Safety are Overlooked comparing to General Construction" and "RMAA Risk Less than General Construction"

6.4 Independent Samples T-test Analysis

Independent samples T-test analysis is used to analyze the divergences of safety attitudes and also the opinion to existing implementation of policy of different groups, such as ages, education levels, years of experience in construction industry and RMAA works experience. The t-test assumes the scores are measured on at least an interval scale, that they are normally distributed, and that the variances in the two groups approximately equal. The 95% confidence interval is that if repeat doing the study 100 times, 95 of the times the true (population) difference would fall within the confidence interval, which is between the "upper" bound and the "lower" bound. If the result shows **Levene's F was statistically significant (*sig. ≤0.05*)**, the variances were significantly different and then the assumption of equal variances was violated. In that case, **the equal variances not assumed** line was used.

6.4.1 *Divergences between Ages*

Table 6.8(a) shows the descriptive statistics of respondents' decision on "Report hazard" with different ages. Table 6.8(b) shows the t-test value of it. The cut point is 26 (≥2) or above and 18-25 (<2) years old *(t=-1.806, df=25.000, p=0.000*). p<0.05, therefore, there was a statistically significant difference found which was significant at the 0.05 level. Yet, the mean difference (-0.115) is small. The statistically significant difference found is due to all group 1 respondents (26 years old or above practitioners) have the same decision on report hazard. To confirm the reliability, further study with larger sample size is recommended.

6.4.2 ***Divergences between Education Levels***

Table 6.9(a) shows the descriptive statistics of respondents‘ decision on 5 items, ―Current ordinance and regulations of construction safety deterrent enough", ―Safety attitudes influenced by colleague", ―Report hazard", ―Safety of RMAA works are overlooked comparing to general construction site" and ―Training and facilities provided by company is useful" different education levels.

Table 6.9(b) shows the t-test values. The cut point is without a degree (≥3) and degree holder (<3) or above. ―Ordinance are enough" *(t=-2.424, df=24.633, p=0.000*); ―Influenced by colleague" *(t=-0.942, df=21.471, p=0.047*); ―Report hazard" *(t=-1.770, df=47.000, p=0.046*); ―RMAA safety are overlooked comparing to general construction" *(t=1.088, df=16.653., p=0.029*); ―Training is useful" *(t=-1.134, df=23.898, p=0.038*). p<0.05, therefore, there were statistically significant difference found which was significant at the 0.05 level.

Comparing the results with the literature (Fang, et al., 2006), although its study‘s testing point is primary school level. It shows similar result that higher education level employees possess a different perception of safety attitudes than others. For example of ―Influence by Colleague" item, practitioners with degree education level are less influence by colleague due to reason of peer pressure and managing relationship. Yet, similar case on ―Report hazard", the mean difference (-0.063) is small. The statistically significant difference found is due to all group 1 respondents (without a degree practitioners) have the same decision on report hazard. To confirm the reliability, further study with larger sample size is recommended.

6.4.3 *Divergences between Years of Experience*

Table 6.10(a) shows the descriptive statistics of respondents' decision on "Report hazard" and "Training and facilities provided by company is useful" with different years of experience. Table 6.10(b) shows the t-test value of them. The cut point is 6 (≥2) or above and 0-5 (<2) years of experience. "Report hazard" *(t=-1.781, df=37.000, p=0.003*); "Training is useful" *(t=-2.507, df=49.860, p=0.000*). $p<0.05$, therefore, there was a statistically significant difference found which was significant at the 0.05 level. Item of "Training is useful" goes in line with and support the correlation finding in the above section. Yet, similar case on "Report hazard", the mean difference (-0.079) is small. To confirm the reliability, further study with larger sample size is recommended.

6.4.4 *Divergences between With and Without RMAA Experience*

Table 6.11(a) shows the descriptive statistics of respondents' decision on "Safety of RMAA works are overlooked comparing to general construction site" and "Training and facilities provided by company is useful" between with and without RMAA experience respondents. Table 6.11(b) shows the t-test value of them. The cut point is with (1) and without (2) RMAA experience. "RMAA safety are overlooked comparing to general construction" *(t=1.251, df=36.898, p=0.011*); "Training is useful" *(t=-1.441, df=54.432, p=0.005*). $p<0.05$, therefore, there were statistically significant difference found which was significant at the 0.05 level.

Group Statistics

	Age	N	Mean	Std. Deviation	Std. Error Mean
Report Hazard	>= 2.00	36	1.0000	.00000	.00000
	< 2.00	26	1.1154	.32581	.06390

Table 6.8(a) Descriptive statistics on "Report hazard" with different ages

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Report Hazard	Equal variances assumed	24.039	.000	-2.132	60	.037	-.11538	.05413	-.22366	-.00711
	Equal variances not assumed			-1.806	25.000	.083	-.11538	.06390	-.24698	.01621

Table 6.8(b) t-test value of "Report hazard" with different ages

Remark: The mean difference (-0.11538) is small. To confirm the reliability, further study with larger sample size is recommended.

Group Statistics

	Education	N	Mean	Std. Deviation	Std. Error Mean
Ordinance are Enough	>= 3.00	14	1.2143	.42582	.11380
	< 3.00	48	1.5417	.50353	.07268
Influenced By Colleague	>= 3.00	14	1.3571	.49725	.13289
	< 3.00	48	1.5000	.50529	.07293
Report Hazard	>= 3.00	14	1.0000	.00000	.00000
	< 3.00	48	1.0625	.24462	.03531
RMAA Safety are Overlooked comparing to General Construction	>= 3.00	13	1.3077	.48038	.13323
	< 3.00	40	1.1500	.36162	.05718
Training is Useful	>= 3.00	12	1.0833	.28868	.08333
	< 3.00	45	1.2000	.40452	.06030

Table 6.9(a) Descriptive statistics on "Ordinance are enough", "Influenced by colleague", "Report hazard", "RMAA safety are overlooked comparing to general construction", "Training is useful" with different education levels

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Ordinance are Enough	Equal variances assumed	19.480	.000	-2.210	60	.031	-.32738	.14815	-.62373	-.03103
	Equal variances not assumed			-2.424	24.633	.023	-.32738	.13503	-.60569	-.04907
Influenced By Colleague	Equal variances assumed	4.129	.047	-.934	60	.354	-.14286	.15295	-.44881	.16310
	Equal variances not assumed			-.942	21.471	.356	-.14286	.15159	-.45769	.17197
Report Hazard	Equal variances assumed	4.147	.046	-.950	60	.346	-.06250	.06576	-.19405	.06905
	Equal variances not assumed			-1.770	47.000	.083	-.06250	.03531	-.13353	.00853
RMAA Safety are Overlooked comparing to General Construction	Equal variances assumed	5.032	.029	1.257	51	.214	.15769	.12541	-.09407	.40945
	Equal variances not assumed			1.088	16.653	.292	.15769	.14499	-.14869	.46407
Training is Useful	Equal variances assumed	4.513	.038	-.935	55	.354	-.11667	.12481	-.36679	.13346
	Equal variances not assumed			-1.134	23.898	.268	-.11667	.10286	-.32901	.09568

Table 6.9(b) t-test value of "Ordinance are enough", "Influenced by colleague", "Report hazard", "RMAA safety are overlooked comparing to general construction", "Training is useful" with different education levels

Remark: The mean difference (-0.06250) is small. To confirm the reliability, further study with larger sample size is recommended.

Group Statistics

	Years of Experience	N	Mean	Std. Deviation	Std. Error Mean
Report Hazard	>= 2.00	24	1.0000	.00000	.00000
	< 2.00	38	1.0789	.27328	.04433
Training is Useful	>= 2.00	23	1.0435	.20851	.04348
	< 2.00	34	1.2647	.44781	.07680

Table 6.10(a) Descriptive statistics on "Report hazard" and "Training is useful" with years of experience

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
Report Hazard	Equal variances assumed	9.526	.003	-1.411	60	.163	-.07895	.05595	-.19087	.03298
	Equal variances not assumed			-1.781	37.000	.083	-.07895	.04433	-.16877	.01088
Training is Useful	Equal variances assumed	31.243	.000	-2.208	55	.031	-.22123	.10019	-.42201	-.02044
	Equal variances not assumed			-2.507	49.860	.015	-.22123	.08825	-.39850	-.04396

Table 6.10(b) t-test value of "Report hazard" and "Training is useful" with years of experience

Remark: The mean difference (-0.07895) is small. To confirm the reliability, further study with larger sample size is recommended.

Group Statistics

	RMAA Experience	N	Mean	Std. Deviation	Std. Error Mean
RMAA Safety are Overlooked comparing to General Construction	1.00	22	1.2727	.45584	.09719
	2.00	31	1.1290	.34078	.06121
Training is Useful	1.00	22	1.0909	.29424	.06273
	2.00	35	1.2286	.42604	.07201

Table 6.11(a) Descriptive statistics on "RMAA safety are overlooked comparing to general construction" and "Training is useful" between with and without RMAA experience

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
RMAA Safety are Overlooked comparing to General Construction	Equal variances assumed	6.881	.011	1.314	51	.195	.14370	.10935	-.07584	.36323
	Equal variances not assumed			1.251	36.898	.219	.14370	.11485	-.08904	.37643
Training is Useful	Equal variances assumed	8.592	.005	-1.328	55	.190	-.13766	.10370	-.34548	.07015
	Equal variances not assumed			-1.441	54.432	.155	-.13766	.09551	-.32911	.05378

Table 6.11(b) t-test value of "RMAA safety are overlooked comparing to general construction" and "Training is useful" between with and without RMAA experience

CHAPTER 7

Discussions and Conclusions

7.1 Discussions

7.2 Conclusions and Recommendations

7.3 Limitations of Study

CHAPTER 7
Discussions and Conclusions

7.1 Discussions

Results of this study reflected many aspects of perceptions of RMAA safety in Hong Kong. The finding show "Low safety awareness of RMAA workers" is the major cause of accidents. It is in line with the existing literature. It may due to the RMAA work nature. RMAA works are commonly work in an occupied buildings, workers may not treat it as a construction site and hardly conscious the hazard and dangerous. As the result they perform a lower safety standard and the safety awareness is lower than workers in general construction site. Surely, occurrence of accident should not be solely a single factor can explain. Also, "Insufficient safety training of RMAA workers for muti-tasks" and "Hurry to finish the work" are the other causes with high ranking. It reflects that it is necessary to enhance the safety awareness of workers through safety training course.

In the survey, ranking of most concern factor during RMAA period was asked. Although the results show "Safety" is come first before "Quality", "Cost" and "Time", bias may exist. It is because it is a safety questionnaire, when the practitioners' response to the question may have a mindset towards safety. Therefore, the result may not fully reflect the real situation of RMAA work. Further studies may need to identify the result in alternative way.

The research shows when accident occurs, most respondents thinks that main contractor and worker are the responsible person. It is also the nowadays public perspectives. Normally, less people will consider it is the fault of client/developer or government. However, to some extent client/developer and government contribute to the construction safety; like client may set a tight schedule to the contractor to complete the work and government policy may also influence the safety performance of construction.

Organizational policy and attitudes are the most influencing factors to improve safety attitudes. In addition, supervisor and safety officer‘s instructions can also improve it towards RMAA works. It suggests that company should implement more safety policy such as regular safety training courses and safety inspection to the workers to improve the safety performance. Yet, the finding shows the most limitation to existing format towards RMAA work safety management is the workers‘ behavior and attitudes. An important finding of a negative approach to improve worker‘s safety attitudes is when they heard a serious construction accident happened recently, they will pay more attention to safety. It shows a poor phenomenon that workers can improve their safety attitudes if there is accidents occurred. Therefore, it is an important issue to change the safety attitudes of workers.

Difference ages and years of experience of practitioners in construction industry have different safety attitudes. According to statistical analysis, younger and less experience practitioners‘ safety attitudes is easier to be influenced by their colleague due to the peer pressure and managing better relationship with them as Choudhry and

Fang(2008) stated co-workers‘ attitudes involved in unsafe behavior. Siu, et al. (2003) showed some older workers do indeed have more positive attitudes toward safety comparing with younger workers. In this study, more number of younger practitioners thinks that RMAA work accidents are unpreventable and they treat RMAA works risk is less than that of general construction site which is opposite to the view of practitioners with more experience. Also, less experience practitioners suppose to have less knowledge, training and skills, yet they are likely to consider training and facilities provided by company is useless comparing to practitioners with more experience. It reflects the divergence of safety attitudes with ages and years of experience in construction. It can conclude that young practitioners who with less experience, their safety attitudes and awareness are poor and lower than those older practitioners with more experience and this problem should be worried.

Differences in education levels have difference safety attitudes. It shows similar result to literature (Fang, et al., 2006) that higher education level employees possess a more positive perception of safety attitudes than others. Such as, in the study of ―Influence by Colleague” item, practitioners with degree education level are less influence by colleague.

Practitioners with and without RMAA work experience have different safety attitudes towards RMAA work. With RMAA experience practitioners are in line with more experience practitioners, they think that RMAA risk and dangerous in RMAA are not less than that of general construction. It can assume that there is a misunderstanding to practitioners without RMAA experience. They may think the size of RMAA project is

smaller than general construction, the job nature is simpler and RMAA works risk is lower comparing to general construction work, thus, under estimated the risk.

However, Practitioners with and without RMAA work experience both agree that safety of RMAA works are overlooked comparing to general construction. It is strong evidence showing that nowadays RMAA work safety is overlooked by the construction industry and it is expected to rectify the current situation.

7.2 Conclusions and Recommendations

The research highlights that low safety awareness of RMAA workers is the major underlying cause of accident. Safety training course should be provided by the companies and government especially on RMAA aspects. More training and education should be provided to young and less experience workers. The government should provide more financial subsidies to the small contractor companies and workers. As workers are the major victims in case of accidents, workers performs good safety practice is the most efficient way to prevent accidents and improve safety performance

Organizational factor influence the safety performance. Contractors should play the active role to create a positive safety climate within the organization. Some new safety policy and measurement should be implemented to current RMAA situation. Clients and developers should also play the role to emphasize the importance of safety aspect to contractor. They should balance the time and safety so that contractor has sufficient of time to complete the works. It prevents contractor forcing worker to finish the work in hurry. Also clients are recommended to put safety clauses in the contract.

Many practitioners under estimated the risk and dangerous exposing to RMAA workers and overlooked the RMAA safety. In order to rectify construction industry practitioners or even public citizens misunderstanding, government should provide more promotion to enhance the public awareness towards RMAA safety, such as reporting the accident rate of RMAA work through news. Besides, suitable legislation and policy is an effective way to control the safety standard and prevent the occurrence of RMAA work accidents. However, under the Construction Sites (Safety) Regulations of F&IUO, many RMAA works (employing not more than 10 workmen or the duration of the work less than 6 weeks) are no needed for notification of commencement of works to the Commissioner for Labour. The Labour Department statistics on RMAA works can only allow for revealing part of the accident scene. Also, under Safety Officers and Safety Supervisors Regulations of F&IUO, many RMAA works (employing less than 20 workmen) are not need to have a safety supervisor. In addition, Safety Charter, Pay for Safety Scheme and Independent Safety Auditing Scheme are not commonly used in RMAA works due to small contract sum. Thus, the government is necessary to launch some schemes which are suitable for small scale work safety.

Eventually, the Minor Works Control System (MWCS) has been fully implemented on 31 December 2010. Contractor companies and individual practitioners are required to register as minor works contractors after proper training. The objectives of MWCS are to provide a safe, quality assured and statutory way to carry out minor works which includes RMAA works. However, the registration progress of contractor and worker are unexpectedly slow. It may due to the complicated registration procedure. To

improve it, government is recommended to simplify the registration procedure and to speed up the handling time for application.

7.3 Limitations of Study

7.3.1 ***Limited Sample Size***

In the study, limited number of questionnaires (sample size) is collected. There were 14 out of 100 construction firm with a total of 62 effective responses were finally collected. To have a more valid and reliable statistical analysis, it is better to have more data collected. For instance in the study, the Independent Samples T-test, although significant differences were found on "Report hazard" statement, the mean difference is small. To confirm the reliability, further study with larger sample size is recommended.

7.3.2 ***Limited Number of Safety Attitude Questions***

In the questionnaires, besides the basic information of respondents, only 15 attitude questions were set. In fact, there are room for further introducing more safety perceptions and attitudes questions in the study. It is expected more perspectives of safety attitudes can be explored and the findings would be more valid and reliable by setting more numbers of questions.

7.3.3 ***Limited Time Frame***

The surveys were carried out in a limited and defined time frame. Since safety culture on attitudes of the personnel will change with time, it would affect the accuracy of the results.

7.3.4 ***Not Incorporated RMAA Workers Views***

In the study, consultants, managers and supervisory staffs‘ views are incorporated. However, it has not incorporated views of RMAA workers who are more likely to be the victims in case of accidents. With the first person standpoints, workers may have different opinions from the consultants, managers and supervisory staffs. More research for workers perspectives on safety attitudes could be done in further study. Finally, it is expected that more RMAA work safety can be concerned by the public in the future.

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Appendix A

Questionnaire
"A Study of Construction Safety Attitudes in Repair, Maintenance, Alteration and Addition (RMAA) Works in Hong Kong"

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Basic Information

Gender: ☐ Male ☐ Female
Nationality: _____
Age: ☐18 – 25 ☐26 – 35 ☐ 36 – 45 ☐ 46 – 55 ☐ 56 or above
Occupation: _____
Post / Title: _____
Education level: _____
Year of experience in Construction industry: _____
Have experience in RMAA works: ☐ Yes ☐ No

1. Accidents occur because of (Rank from 1 to 8, 1 is the most important reason, 8 is the least.One number can only be chosen once)
   - ☐ Inadequate safety supervision
   - ☐ Hurry to finish the work
   - ☐ Low safety awareness of RMAA workers
   - ☐ Inadequate site safety planning and hazard assessment
   - ☐ Insufficient safety training of RMAA workers for multi-tasks
   - ☐ Poor housekeeping and congested working environment
   - ☐ Low safety awareness of small-medium sized contractors and property owners in RMAA works
   - ☐ Hazard of work nature

2. Would your own safety attitudes be influenced by your colleagues?
   - ☐ Yes, I would follow them, because of the peer pressure
   - ☐ Yes, I would follow them, because I can manage a better relationship with them
   - ☐ No, I wouldn't follow them,because I have an own personal safety expectation
   - ☐ Others (please specific: _____)

3. Who would be the responsible person while accident occurred in RMAA works? (may choose more than 1 answer)
   - ☐ Workers
   - ☐ Client / Developer
   - ☐ Main Contractor
   - ☐ Government
   - ☐ None of person
   - ☐ Others (please specific: _____)

4. Which is the most concern factor during RMAA period? (Rank from 1 to 4, 1 is the most important factor, 4 is the least. One number can only be chosen once)
   - ☐ Time ☐ Cost ☐ Quality ☐ Safety

5. Which are the most influencing factors that would improve worker‘s safety attitudes towards RMAA works? (may choose more than 1 answer)
   - ☐ Company policy/attitudes
   - ☐ Supervisor/Safety Officer‘s instructions
   - ☐ Legislation & Cope of Practices
   - ☐ Safety training
   - ☐ Heard a serious construction accident happened recently
   - ☐ Safety promotion
   - ☐ Others (please specific: _____)

6. Would you report any hazard to your Supervisor/Safety officer while you have discovered it on RMAA work?
   - ☐ Yes, I would, because it is my responsibility
   - ☐ Yes, I would, because it affects my personal safety and other‘s personal safety
   - ☐ No, I wouldn‘t, because it is not my responsibility
   - ☐ No, I wouldn‘t, because I believe that it isn‘t affect me
   - ☐ No, I wouldn‘t, because other people will report it
   - ☐ Others (please specific: _____)

7. RMAA construction accidents are unpreventable.
   - ☐ Strongly agree
   - ☐ Agree
   - ☐ Uncertain
   - ☐ Disagree
   - ☐ Strongly disagree

8. Safety of RMAA works are overlooked comparing to that of general construction site.
   - ☐ Strongly agree
   - ☐ Agree
   - ☐ Uncertain

☐ Disagree
☐ Strongly disagree

9. Risk and dangerous exposing by workers in RMAA works are less than that of general construction site.
   ☐ Strongly agree
   ☐ Agree
   ☐ Uncertain
   ☐ Disagree
   ☐ Strongly disagree

10. Do you think which government department(s) or construction organization(s) has/have paid enough concern to the RMAA works safety? (may choose more than 1 answer)
    ☐ Labour Department ☐ Occupational Safety and Health Council
    ☐ Hong Kong Construction Industry Employees general Union
    ☐ Construction Industry Council ☐ Others (please specific: _____)

11. Do you think that the current Ordinance and Regulations related to construction safety are deterrent enough?
    ☐ Yes
    ☐ No, it cannot proceed adequately in current RMAA work
    ☐ No, punishment is insufficient ☐ Others (please specific: _____)

12. What are the limitations to existing format towards RMAA work safety management? (may choose more than 1 answer)
    ☐ Society Culture ☐ Company policy/attitudes
    ☐ Legislation & Cope of Practices ☐ Industry background
    ☐ Workers' behavior and attitudes ☐ Work nature
    ☐ Others (please specific: _____)

13. What kinds of the RMAA safety training courses and facilities have been provided by your company? (may choose more than 1 answer)
    ☐ Safety Induction / Seminar ☐ Adequate personal safety equipment
    ☐ Safety training course ☐ Safety Orientation
    ☐ Award on well done workers on safety aspect
    ☐ Regular feedback collection from worker
    ☐ Others (please specific: _____)

14. Do you think the training and facilities provided from your company is useful?
    ☐ Yes, it is useful, because it provide me an adequate knowledge on site safety

☐ Yes, it is useful, because it enhance the current safety culture and the degree of safety awareness
☐ No, it is useless, because it only provide a fundamental knowledge on site safety
☐ No, it is useless, because accident is not preventable
☐ Others (please specific: _____)

15. What kinds of training and facilities should be provided to the worker by your company? (may choose more than 1 answer)
☐ Safety Induction/Seminar ☐ Adequate personal safety equipment
☐ Safety training course ☐ Safety orientation
☐ Award on well done workers on safety aspect
☐ Regular feedback collection from worker
☐ Others (please specific: _____)

Other commentsor suggestions:

_____
_____
_____
_____
_____
_____

END
Thank You For Your Help

Appendix B

論文問卷調查

「研究香港小型及樓宇維修工程安全態度」

學生：**周澧邦, Averi**
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(Lecturer, Department of Building and Construction, CityU)

基本資料

性別：☐男　　☐女
國籍：_____
年齡：☐18-25　☐ 26 – 35　☐ 36 – 45　☐ 46 – 55　☐ 56 或以上
職業：_____
職位；_____
教育程度：_____
建築行業經驗(年)：_____
曾經參與小型及樓宇維修工程：☐是　　☐否

1. 建築工業意外發生由於
(請排列_1‘至_8‘代表其重要次序，_1‘為最重要原因，每個數字只可選一次)
☐安全監督不足
☐急於完成工作
☐工人安全意識低
☐地盤安全計劃及風險評估不足
☐工人安全訓練不足
☐地盤環境差和擁塞
☐小型工程承建商和業主安全意識低
☐工作性質危險

2. 你認為同事間對地盤安全的態度，會否影響到你對地盤安全的觀念/態度？
(請選擇其中一個答案)
☐會跟隨他們，他們會給予我一種壓力
☐會跟隨他們，這能維持良好關係
☐不會跟隨他們，我有自己一套安全指標

☐其他_____

3. 若在地盤發生意外，你認為誰要負上責任？(可選擇多於一個答案)
☐工人 ☐發展商
☐承建商 ☐政府
☐沒有人 ☐其他_____

4. 工程進行時，你認為以下哪一點最重要？
(請排列‘1’至‘4’代表其重要次序，‘1’為最重要，每個數字只可選一次)
☐完工期 ☐工程費用 ☐工程品質 ☐地盤安全

5. 你認為哪個政府部門或建造業機構或組織對樓宇維修工人的安全提供足夠的關注？(可選擇多於一個答案)
☐勞工處 ☐職業安全健康局
☐建造業議會 ☐香港建造業總工會
☐其他_____

6. 你認為現行有關地盤安全的法例具阻嚇作用，使公司及工人注意安全嗎？
(請選擇其中一個答案)
☐能夠 ☐不能，現行法例未能確實在樓宇維修地盤執行
☐不能，刑罰太輕☐其他_____

7. 你認為現行地盤安全的作業模式，是受制於以下那項的影響？
(可選擇多於一個答案)
☐社會文化 ☐公司政策/ 觀念
☐法律條文/ 安全規則 ☐工程行業背景
☐工人表現和態度 ☐地盤工作性質
☐其他_____

8. 以下那項最能提高你對地盤安全的態度？(可選擇多於一個答案)
☐公司政策/ 觀念 ☐管工/ 安全主任的指示
☐法律條文/ 安全規則 ☐工人安全訓練
☐得知最近曾發生嚴重地盤工業意外☐工人安全推廣
☐其他_____

9. 現公司給予哪種地盤安全訓練及系統予員工？(可選擇多於一個答案)

☐地盤安全講座　　☐提供足夠個人防護設施
☐地盤安全訓練　　☐新入職員工地盤遊覽
☐對安全表現良好的員工給予獎勵　　☐定期收集員工意見
☐其他_____

10. 你認為現時公司所提供的在職工業安全訓練有用嗎？
(請選擇其中一個答案)
☐有用，給予充分的地盤安全知識　　☐有用，提高了安全文化及意識
☐沒有用，只提供最基本的訓練，可有可無
☐沒有用，意外是不能避免的
☐其他_____

11. 你認為公司應提供以下哪些地盤安全訓練及系統予員工？
(可選擇多於一個答案)
☐地盤安全講座　　☐提供足夠個人防護設施
☐地盤安全訓練　　☐新入職員工地盤遊覽
☐對安全表現良好的員工給予獎勵　　☐定期收集員工意見
☐其他_____

12. 當你在地盤見到一些潛在危險時，你會否向安全主任/ 管工匯報？
(請選擇其中一個答案)
☐會，這是各人在地盤工作的責任　　☐不會，這不是我的責任
☐會，這會影響到自身及他人的安全☐不會，我認為這不會影響我
☐不會，其他人自然會匯報　　☐其他_____

13. 小型及樓宇維修工程意外是無可避免的(請選擇其中一個答案)
☐非常同意
☐同意
☐不確定
☐不同意
☐非常不同意

14. 與一般建築地盤的安全比較，小型及樓宇維修工程的安全會較被人忽略
(請選擇其中一個答案)
☐非常同意
☐同意

☐不確定
☐不同意
☐非常不同意

15. 與一般建築地盤比較，小型及樓宇維修工程的工人面對的工作危險性較低
(請選擇其中一個答案)
☐非常同意
☐同意
☐不確定
☐不同意
☐非常不同意

其他意見及建議：

_____
_____
_____
_____
_____
_____

完

謝謝您的合作

Appendix C

4th January, 2011

Dear Sir/Madam,

Survey of
"A Study of Construction Safety Attitudes in Repair, Maintenance, Alteration and Addition Works (RMAA) in Hong Kong

I am a final year student for a Bachelor of Engineering Degree in Building Construction Engineering and Management at City University of Hong Kong. I am working on a dissertation titled "A Study of Construction Safety Attitudes in Repair, Maintenance, Alteration and Addition Works (RMAA) in Hong Kong". As a part of my work, questionnaires are prepared to investigate (1) to identify causes of accidents in RMAA works in relation to safety attitudes; and (2) to investigate the safety attitudes and behavior of different groups of people towards RMAA works. The target persons are manager, supervision and consultant level persons.

The findings of the survey will then be utilized to evaluate of different levels of personnel within the construction companies and lead to improvements and suggestions on safety problems for the RMAA sector.

All information from the questionnaires will be strictly used for survey purposes. The source of information will not be disclosed. If you may interest to know the result of this survey, I will be very please to provide you with this information by sending to you.

The success of the survey will greatly depend on your participation. It will be very kind of you could arrange the interview to me in one of the construction sites or complete the questionnaire at the below web-site.

http://www.my3q.com/survey/355/averichaw/47444.phtml

If you have any queries, please call Averi at .

Attached please find a letter from my supervisor and the questionnaire for your reference. Thanks for your kindness assistance and cooperation.

Yours sincerely,

_____

Averi, Chaw Lai Pong

Appendix D

敬啟者：

論文問卷調查

「研究香港小型及樓宇維修工程安全態度」

本人就讀香港城市大學建築工程及管理系的三年級學生，現正進行一份論文問卷調查，題目為「研究香港小型及樓宇維修工程安全態度」。意見收集後會進行分析，最終目的為在小型及樓宇維修工程的安全上提出建議及改善方法。

所有資料純粹為研究之用，而資料來源絕不公開。如貴公司對調查結果有任何查詢，本人非常樂意為你提供資料。

調查成功與否有賴 貴公司的參與，本人非常感謝貴公司若貴公司能安排本人到貴公司或其中一個地盤約見，或完成問卷並回郵、或透過以下網址完成問卷調查
http://www.my3q.com/survey/355/averichaw/47444.phtml
如有任何疑問，請聯絡周澧邦。

郵件附件有香港城市大學教授的書面確認，連同問卷作為填寫以及回郵信封。
在此，本人衷心希望得到貴公司的幫助。

此致

XX 工程

香港城市大學學生

周澧邦

二零一一年一月四日

Appendix E

5th January, 2011

TO WHOM IT MAY CONCERN

FYP STUDY ON: **A Study of Construction Safety Attitudes in Repair, Maintenance, Alteration and Addition Works (RMAA) in Hong Kong**
STUDENT NAME : **CHAW Lai Pong** MOBILE:

This is to certify that Mr. Chaw Lai Pong is a final year student pursued at BEng(Hons) in Building Construction Engineering and Management Programme in Department of Building and Construction, City University of Hong Kong.

Mr. Chaw Lai Pong has to produce a Final Year Project on a topic of ―A Study of Construction Safety Attitudes in Repair, Maintenance, Alteration and Addition Works (RMAA) in Hong Kong". In this regard he is expected to make his own direct investigations and obtain information from publications and other sources.

I would appreciate any help and assistance you can give the student in this connection. I can confirm that any information provided will use purely for academic purposes.

_____

Dr. Fung, Ivan Wing-hong
Lecturer
Department of Building & Construction,
City University of Hong Kong
Tel.: 34427036
Fax : 27887612

Appendix F

Model for development, implementation and maintenance of a safety management system

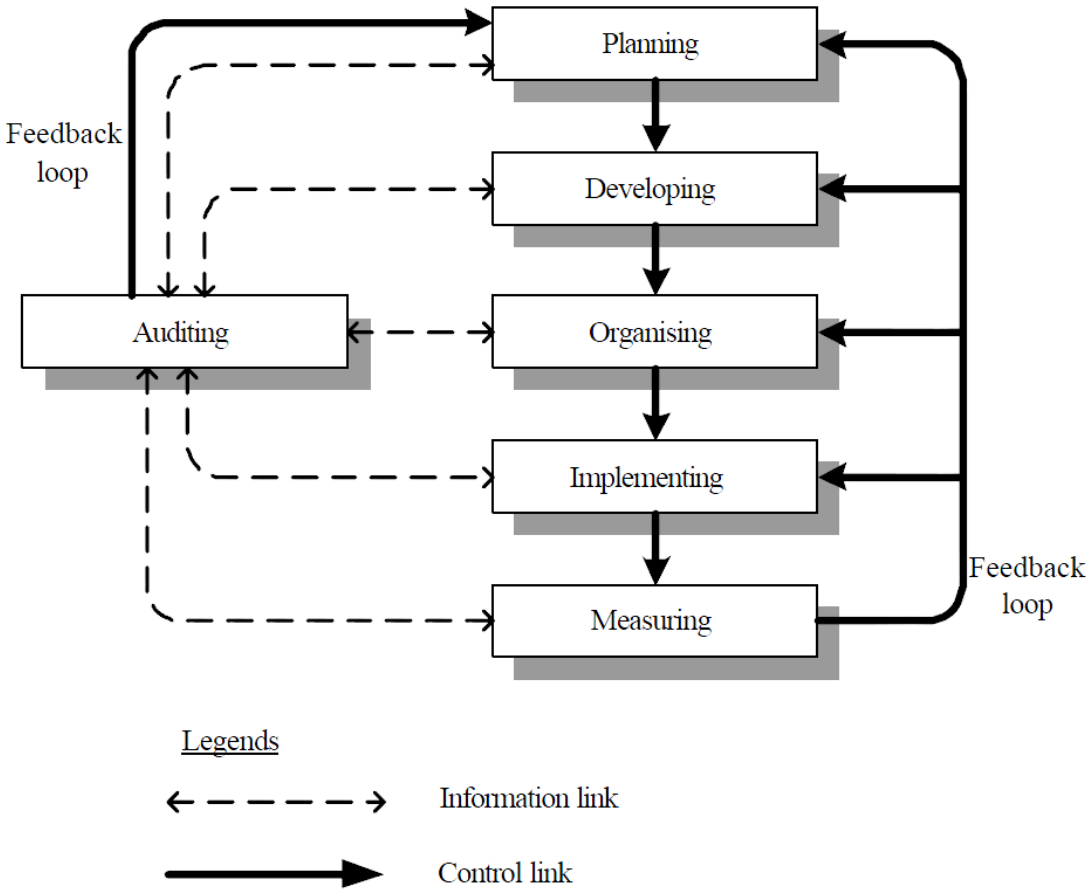
The following shows the brief model for development, implementation and maintenance of a safety management system containing the 14 elements (Labour Department 1999).

The **development** of a safety management system involves the finer aspects of planning and developing. Planning is the process of determining in advance what should be accomplished. Developing is the process of determining how the objectives should be realized.

The **implementation** of a safety management system involves the finer aspects of organizing and implementing. Organizing is the process of prescribing formal relationships among people and resources in the organization to accomplish objectives. Implementing means a process of carrying out or putting into practice the plans to achieve the desired objectives, with appropriate and adequate control to ensure proper performance in accordance with the plans.

Maintenance of a safety management system involves the finer aspects of measuring and auditing, through which an enterprise knows whether its safety management system is working well or needs improvement, thereby maintaining the system in an efficient and effective state. Measuring is the process of checking performance against agreed standards to reveal any improvement need. The measuring stage provides a ―feedback loop" to the stages of development and implementation of a safety management system and help in reinforcing and maintaining its ability to reduce risks to ensure the continued efficiency, effectiveness and reliability. Auditing is carried out in addition to the routine monitoring of occupational safety and health performance referred to measuring. Auditing constitutes the ―feedback loop" to the planning stage which enables the enterprise to reinforce, maintain and develop its ability to reduce risks to the fullest extent and to ensure the continued efficiency, effectiveness and

reliability of the safety management system. In addition, there should be information flowing between the development, implementation and maintenance stages and the auditing stage so as to ensure the correct operation of the safety management system. The management model to develop, implement and maintain a safety management system is summarized in the following.



From A Guide to Safety Management, Occupational Safety and Health Branch, Labour Department

Appendix G

Target Buildings of Operation Building Bright

The Operation will cover two categories of target buildings:

Category 1

Category 1 covers buildings with OCs. The OCs which considers that their buildings fulfill the "Eligibility Criteria" shown below may submit applications for joining as Category 1 target buildings by completing the "Application Form for Category 1 Target Buildings".

Category 2

A steering committee comprises representatives from the Buildings Department (BD), the Housing Society and the URA will select buildings having difficulties in coordinating repair works (e.g. buildings without OCs), which have structural safety problems and defective sanitary facilities as Category 2 target buildings, and assist the owners to carry out the repair works.

Eligibility Criteria

Target buildings of the Operation should meet the following criteria (HKHS, 2009):

i. the building is a private residential or composite building aged 30 years or above (counting from the date of the Occupation Permit of the building, the building shall be aged 30 years or above as at 6 June 2009, i.e. the Occupation Permit should be dated on or before 6 June 1979);

ii. the whole estate or whole building comprises no more than 400 residential units;

iii. the average annual rateable value of the residential units:

- not exceeding HK$100,000 for properties in the urban area (including Hong Kong Island, Kowloon, Shatin, Kwai Tsing and Tsuen Wan);
- not exceeding HK$76,000 for properties in other areas; (OC may make reference to the rateable values as stated in the recent rates demand notes of the residential units in the high, middle and low zones within the building)

iv. with OC formed; and

v. the building lacks maintenance or is in dilapidated condition, requiring repair and maintenance works (examples include buildings subject to statutory orders issued by the BD).