Hong Kong construction foremen's safety responsibilities: a case study of management oversight

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Keywords

Construction industry, Safety, Foremen, Responsibility, Supervision, Hong Kong

Abstract

In total, 69 foremen from 13 Hong Kong construction companies were invited to participate in a study designed to investigate foremen's opinions regarding 27 safety supervisory tasks. These fell into six categories, including handling new workers, training, safety, discipline, coordinating, and motivating. Results of the survey and subsequent follow-up interviews showed that over two thirds of foremen claimed that they had the responsibility to perform certain tasks but only half said that they had the authority to perform these tasks. Further interviews and on-site observations of foremen were then conducted in order to validate the findings by way of case study material. It is concluded that foremen play a key role in ensuring that safety management systems operate effectively. It appears, from the results of the study, that this role is not being performed properly and that the key interface between worker and management, the role of the foreman, is not paid sufficient attention by senior management and is an area requiring urgent attention if Hong Kong's poor site safety record is to be improved.

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Introduction

Hong Kong has, until very recently, been a rapidly expanding commercial and financial centre. Many building and civil engineering works have been carried out to meet the growing demands of industry and commerce. The construction activities have brought a parallel increase in injuries to workers. Reasons for this are many, and have been discussed by Gow and Lam (1991), Lingard and Rowlinson (1991, 1994a, b) and Rowlinson *et al.* (2000).

This paper reports on research undertaken by the authors which found many problems associated with Hong Kong construction foremen's safety supervision role. Foremen's opinions regarding their safety responsibilities in relation to their daily supervisory duties were investigated as this aspect of the site safety management system has, to a large extent, been omitted from previous research in Hong Kong. Foremen are the interface between management and the operational system. As such, foremen play a key role in ensuring that the safety management system operates effectively – they make the inert system operational. When considering this role, the concepts developed in small world theory (Barabassi, 2002) are seen to be highly relevant.

Responsibility is seen as the obligation of foremen to satisfactorily perform their assigned duties and the functions of their position, an obligation to achieve objectives by performing required activities (Lussier 1989, p. 64). A major responsibility of a foreman is to report to the immediate superior who represents higher management. Foremen who do not understand their department's functions and responsibilities have a lower chance of being successful (Lussier, 1989).

The objective of the research was to investigate the role that the foreman plays in implementing safety management systems on Hong Kong construction sites. In particular, the contrast between what the foreman perceives as his role and how he is empowered to fulfill that role was investigated. Without empowerment, the best conceived safety management system will fail due to non-implementation. The research took place within the context of a move to self-regulation, performance-based legislation, in Hong Kong that required all construction contractors to implement a well-defined safety management

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system. A key element of such a system is the empowerment of the foreman, the link between worker and management (see, for example, Rowlinson, 1997).

The nature of the safety management system in place was investigated and foremen's responsibilities identified, as far as possible. It was then important to determine if foremen thought that they had the responsibility to do a particular task, as it was conjectured that they would pay more attention to the task and make efforts to complete said task if this was the case and this would ensure implementation of the safety management system. If foremen thought that they had no responsibility to do a particular task or that they were not empowered to complete the task, a failure in the safety management system had been identified, and it was anticipated that system failures would arise.

Theoretical background

The theoretical bases of the research go back as far as Petersen's (1976) work focusing on safety supervision. According to Petersen (1976), foremen in an industrial establishment have 48 daily tasks to perform, of which 27 are relevant to safety supervision. These 27 daily safety supervisory tasks, identified by Petersen (1976) and mapped against the existing safety management system, in six categories (handling of new workers, training, safety, discipline, coordination, and motivating) were assessed by means of face-to-face interviews with Hong Kong construction site foremen. The tasks are listed in Table I.

The importance of safety supervision was shown in a survey conducted by the National Safety Council of the USA as early as 1967 (National Safety Council, 1967) in which 148 industries participated. The results indicated that safety supervision was considered to be the most important area among a group of eight in a safety program. Research by Samelson (1977) indicated that a poor safety record is often associated with poor site supervision. In recognition of the importance of the relationship between site safety supervision and accidents, the Hong Kong Government enacted the Factories and Industrial Undertaking (Amendment) Ordinance 1989 which imposes a duty on proprietors to provide adequate supervision to ensure health and safety at work of all persons employed (Labour Department, 1990). However, little has been written recently about the state of this aspect of the safety management system, but great store has been placed on the concept of self-regulation based on the adoption of a comprehensive (14 point in Hong Kong) safety management system.

Over the years, the literature reveals that site foremen are important in providing site safety supervision to workers (Heinrich, 1941, pp. 47, 137; Heinrich *et al.*, 1980, p. 76; Petersen, 1976, pp. 1, 36; Grimaldi and Simonds, 1989, p. 21) because they are on the front-line in production, work alongside workers, and know what is happening at any moment on site. In fact, foreman have for a long time been expected to take responsibility for safety at work regardless of whom he or she supervises (National Safety Council, 1988, p. 5). As a result, an understanding of foremen's views on safety supervision is an essential prerequisite to improving accident rates.

Foremen were encouraged to give their opinions regarding their safety responsibilities in respect of their daily safety supervisory tasks. The objective of this questioning was to understand in what sense foremen knew and understood what safety responsibilities they had.

Methodology

A total of 69 foremen from 13 construction companies in Hong Kong were invited to answer the questionnaire developed by the authors. Interviews were conducted in two phases. The first phase was the pilot test which lasted for four months, in which 12 foremen from two construction companies were involved; three foremen from each of the two sites from each of the two construction companies. The second phase was the large scale test in which a further 57 foremen from 11 construction companies, with an average of three foremen from each of two sites of each individual construction company, were interviewed by the authors at their construction sites. Follow-up interviews were then conducted in order to explore the responses and to draw conclusions as to causes for apparently poor performance. A series of site-based studies were then undertaken, with particular reference to subcontractors, in order to observe foremen, and workers, in action and further analyse the

Table I Foremen's opinions regarding their safety responsibilities and authority

The 27 itemized tasks	The percentage of foremen who felt that they had responsibility for this task	The percentage of foremen who felt that they had authority for this task
Handle new workers		
1 Hire new workers	43.5	31.9
2 Orient new workers	91.3	79.7
Training workers		
3 Explain safety operations/rules to workers	91.3	89.9
4 Hold safety meetings	91.3	68.1*
5 Coach workers	97.1	87.0
Safety		
6 Take unsafe tools out of production	85.5	75.4
7 Investigate accidents	55.1	33.3*
8 Establish inspection teams for hazards	31.9	20.3*
9 Inspect their own division	97.1	88.2
10 Correct unsafe conditions	95.7	81.2*
11 Correct unsafe acts	91.3	78.3*
12 Send the injured or sick workers for medical attention	55.1	47.8
Discipline		
13 Issue warnings to workers	95.7	89.9
14 Transfer a worker out of their division	79.7	47.8*
15 Discharge a worker's duties	43.5	37.7*
16 Recommend promotion or demotion to a worker	66.7	55.1
17 Grant pay raises to a worker	26.1	17.4
Coordination		
18 Authorize maintenance or repairs of equipment	73.9	62.3
19 Make suggestions to improve safety	88.2	73.5
20 Discuss safety problems with the management	63.6	53.6
21 Recommend changes in safety policy	40.6	30.4
22 Improve work procedure through safe methods	66.7	50.7*
Motivating		
23 Promote job satisfaction among workers	46.4	36.2
24 Create feeling of belonging among workers	49.3	23.2
25 Help and care for workers' personal problems	42.0	30.4
26 Guarantee job security	31.9	23.2
27 Recommend fringe benefits	68.2	30.3

Notes: * Indicates $p \leq 0.05$ for the correlation between responsibility and authority a mismatch exists at a statistically significant level

situation and corroborate tentative conclusions.

The questionnaire consisted of over 100 questions that elicited information, based around the 27 tasks identified in Table I, about the respondents' responsibilities, knowledge, authority and experience and investigated their views in relation to how both they and management perceived safety performance and how it might be improved. The questionnaire was painstakingly administered to experienced foremen working on building construction sites managed by each of the participating contractors in person in Cantonese (Hong Kong's Chinese dialect). This was the only method that could elicit a meaningful response (in a pilot many foremen refused to give written responses) and only then through the positive and obvious support of site management for the research. Inevitably, on a small number of chosen sites, the response was limited, with foremen citing time pressure as a reason for non-cooperation. With such a face-to-face approach ample opportunity was afforded

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for elaboration on the questions as posed and this added to the richness of the data collected.

The sample chosen was not random but was drawn from the best performing contractors, in terms of safety, on the Hong Kong government list. Foremen were interviewed at work as the final phase of the research demanded a site observation at an ongoing site. Thus, the sample cannot be claimed to be representative of the industry as a whole but it is one that gives a response which is indicative of good safety practice in Hong Kong. Hence, the results have a high level of validity in indicating current practice.

Hypotheses

The research proposition, "to investigate the role that the foreman plays in implementing safety management systems on Hong Kong construction sites", was broken down into a series of sub-hypotheses and these are presented as follows:

- *H1*. Foremen do not know exactly what responsibilities they have in going about their daily safety supervisory tasks.
- *H2*. Foremen do not have adequate authority to perform their daily supervisory tasks.
- *H3*. Foremen do not have adequate knowledge to perform their safety supervisory tasks.
- *H5*. Foremen do not have adequate experience to perform their safety supervisory tasks.
- *H6*. Foremen's safety supervisory performance is not measured by management.
- *H7*. Foremen do not have a good knowledge of safety supervisory techniques.
- *H8*. Foremen are willing to improve the safety supervisory performance.
- *H9*. Foremen's safety supervisory performance overall is poor.

The data collected were coded on a Likert scale and the analysis undertaken compared responses within the sample by means of correlation analyses. A 5 per cent critical region was set for rejecting the null hypothesis but this was then taken as a starting point for further investigation of why such results occurred. The findings reported below are all based on a rejection of the null hypothesis of no association between responsibility and authority at the 5 per cent level.

Results

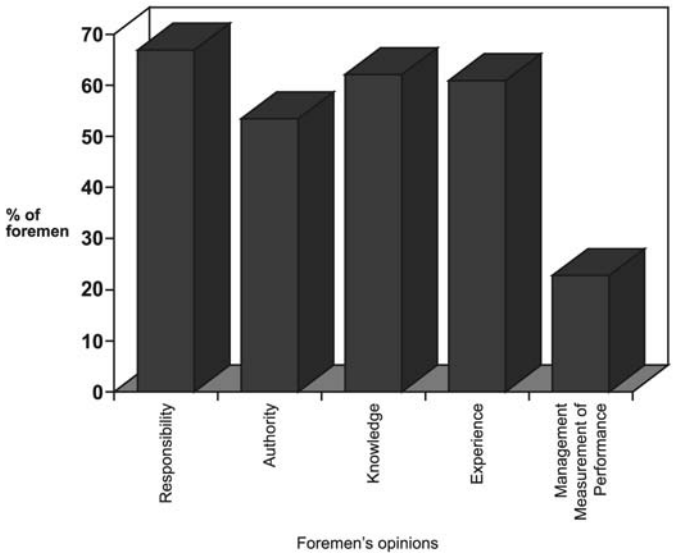
Data collected were analyzed in terms of foremen's perceptions of their safety responsibilities in respect of daily supervisory tasks. With regard to the safety responsibility of the 27 supervisory tasks, Figure 1 shows that two-thirds thought that they had such responsibilities. This implies that a large proportion, over 30 per cent, of the foremen, did not fully understand what safety responsibilities they had. The implications and significance of this finding are discussed later.

Safety responsibilities

The great majority of foremen thought that they had the responsibility for many safety supervisory tasks, in particular orienting new workers, explaining safety operations/rules to workers, holding safety meetings, coaching workers, taking unsafe tools out of production, inspecting their own division, correcting unsafe conditions, correcting unsafe acts, issuing warnings to a worker, transferring a worker out of their division, making suggestions to improve safety.

However, a large proportion of foremen said that they felt they had no responsibility to do the following safety supervisory tasks: hiring new workers, investigating accidents,

Figure 1 Percentage of foremen indicating positive opinions regarding the 27 safety supervisory tasks



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establishing inspection teams for hazards, discharging a worker's duties, recommending changes in safety policy, promoting job satisfaction among workers, creating feelings of belonging among workers, helping and caring for workers' personal problems, and guaranteeing job security, which indicates that foremen had problems defining the extent of their safety supervisory responsibilities. These findings are certainly contrary to the practice outlined in site safety manuals issued on the projects on which many of the foremen worked and contrary to the general guidelines embodied in the safety management systems adopted by their employers.

Table I, the follow up interviews and the site studies indicate that foremen had no authority to do a large number of their safety supervisory tasks. The implication of this is that safety management system failures are likely to emerge, as employees at all levels need adequate authority to get their work accomplished. The problem is particularly acute with delegated tasks. Often a foreman is assigned a task but does not have enough formal authority to gain the cooperation of others in carrying out the task. A foreman's lack of authority implies problems in deciding, in acting, and in commanding others to act (or not to act) in achieving organizational and safety goals. The power to use rewards and penalties is implied in the exercise of authority, and the decisions and actions of any foreman must, of course, be within the scope of the authority granted. Authority rests within a position, and foremen should inherit this authority and its corresponding responsibility (Eckles *et al.*, 1991, pp. 36-7). Workers under those foremen not having authority to perform their duties are unlikely to perform as safely as workers whose foremen have adequate authority to exercise disciplinary action against them. One of the issues that emerged here was the role and nature of subcontract workers and their relationship with contractors' line supervisors. This particular problem is discussed later.

Table I shows that a large proportion of foremen thought that they had no responsibility to do many of the specified safety supervisory tasks. Data from this study also showed that foremen in Hong Kong do not know exactly what safety responsibilities they have on site because, according to interview responses, management have not briefed them, nor trained them, on these issues. Given this set of circumstances, it is quite natural that foremen have not spent appropriate amounts of time and effort on their safety responsibilities. In order to understand the reasons behind this phenomenon the authors conducted interviews with senior personnel from the Hong Kong Occupational Safety and Health Council, the Hong Kong Occupational Safety and Health Association, the Hong Kong Industrial Safety Association, the Hong Kong Construction Association, the Labour Department, and the Society of Registered Safety Officers. These interviews indicated that many contractors had neglected to address the promotion of good safety supervision, even though legislation states (the General Duties of Proprietors (1989)), that proprietors have a duty to provide adequate site safety supervision.

Some of the contractors interviewed told the authors they did not have a list of responsibilities for their foremen. Where construction companies had such a list, it was described in a crude form with few specific details regarding foremen's safety responsibilities. The conclusion drawn was that a large number of foremen in Hong Kong do not know what responsibilities they have because management had not communicated to them what these responsibilities were, nor had many foremen attended formal training courses where such issues were addressed. This conclusion was confirmed by foremen within a company working on the same site giving very different answers for their responsibilities. When asked why this happened, management explained that they assessed performance primarily on foremen's technical knowledge and experience in their occupations and had a hands off approach to day-to-day practice, not wishing to dictate exactly what foremen's responsibilities were. Such attitudes show an underlying misunderstanding on the part of senior management as to the implications of self-regulation and the mechanisms for ensuring that a safety management system works effectively.

Such an approach has led to the situation where safety responsibility is not adequately addressed, with foremen believing that safety was primarily the responsibility of their safety department and not that of front line supervisors. Additionally, training of foremen in safety and management techniques has

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been neglected, with the focus of the former on workers and the latter on management.

Discussion

The conclusions presented here require some degree of qualification as they certainly do not apply to every foreman on site; what has been presented above so far is the overall situation. However, what is presented here are the broader conclusions from the research study.

***H1*. Foremen do not know exactly what responsibilities they have in going about their daily safety supervisory tasks**

Although foremen knew their responsibilities in areas such as worker orientation, explanation of safe ways of operation, holding safety meetings and coaching workers, they were less well aware of their responsibilities in areas such as accident investigation, inspection for hazards and discipline issues with workers. In those areas where they had responsibility there was often a mis-match in the authority they were given to deal with these issues and their responsibility. This reflects a failure in the management system and foremen are really the interface between the management and the operational system. As such, foremen play a key role in ensuring that the safety management system operates effectively. It appears, from the results of this study, that this role is not being performed properly and that the interface associated with it is an area requiring urgent attention in most Hong Kong construction companies. Recent research shows that the more safety-aware supervisors are, the more positive, the safety climate on construction sites (Mohamed, 2002).

***H2*. Foremen do not have adequate authority to perform their daily supervisory tasks**

This issue has already been alluded to. Foremen have particular problems in the areas of hiring new workers, establishing hazard investigation teams, dealing with worker incentives and discipline, and particularly in the area of worker motivation. The lack of authority in these areas undermines the foremen's attempts to make positive changes in worker attitudes and the culture of the construction site. All of the projects investigated had been procured under the traditional (design, tender, construct) procurement route and all operated with a high level of sub-contracting; such an approach is the norm in Hong Kong, notwithstanding the recommendations of the Construction Industry Review Committee in 2001.

***H3*. Foremen do not have adequate knowledge to perform their safety supervisory tasks**

Foremen clearly indicated that they believed their knowledge was deficient in areas such as accident investigation, hazard inspection and safety policy. This result is hardly surprising as they are not given authority in these areas, nor appropriate training. These issues are left to the safety manager or safety supervisor and senior management. It is suggested that this is a key area to be changed in the Hong Kong construction industry. If foremen are given sufficient authority and training in these areas, then potential exists for a significant improvement in safety performance. The reasoning behind this is that all three areas are intimately linked and, if accident investigation leads to identification of hazards and subsequently changes in policy, then beneficial effects in terms of reduced accident rates are likely to follow. Many researchers agree that training, especially in hazard-detection, is a major factor influencing safety levels. The importance of planning to detect potential hazards has a significant role in affecting the overall safety performance (Mohamed and Bostock, 1999). As the foreman is the interface between worker and management, the foreman has the best opportunity to ensure the identified hazards are eliminated.

***H4*. Foremen do not have adequate experience to perform their safety supervisory tasks**

Foremen indicated that the main technical area where they lacked experience was in hazard identification. Although risk assessments are required on Hong Kong projects, the foremen are generally divorced from this process and see it as "mere paperwork" and have no commitment to implementing the outcomes of the risk assessment, even when they are identified in these assessments. Additionally, it was apparent that the majority lacked experience in managerial areas such as promoting job satisfaction and job security. Again, this is an area which is out of the foremen's control as it

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is currently, in Hong Kong, the prerogative of senior management.

H5 Foremen's safety supervisory performance is not measured by management

As far as the great majority of the foremen were concerned, management did not measure their performance in any area. All six areas returned low scores, i.e. handling new workers; training workers; safety practice; discipline; co-ordination and motivation. The underlying impression given by the foremen was that they were not considered to be part of the safety management team. This is an important finding and reflects a serious shortcoming in the way safety management systems are operated on Hong Kong construction sites. By neglecting the role of the foreman, who is the main interface between worker and management, the most potent resource for the promotion of safety improvement is being under-utilized. Effective implementation of any safety management system largely depends on the ability of supervisory personnel (Agrilla, 1999). Moreover, the system should provide the means for controlling and monitoring performance (Smith *et al.*, 1998). Lack of performance measurement by management indicates little interest in benchmarking and continuous improvement, which could be interpreted, in some cases, as having a minimum level of safety management commitment. Research shows a strong association between the latter and a relatively poor safety performance record (Mohamed, 2000).

H6 Foremen do not have a good knowledge of safety supervisory techniques

Foremen scored particularly badly on technical safety supervisory knowledge. Less than 15 per cent of the sample were familiar with the safety regulations in Hong Kong. Almost three-quarters of the sample had no idea on the methods of safety supervision such as incident recall technique (which allows learning from past, non-serious incidents) and hazard hunts. This undoubtedly reflects a shortcoming in the planned education and training of foremen by construction companies. Indeed, it implies that the companies themselves are probably unaware of the range of techniques available for site safety improvements. A key distinguishing feature of superior safety performance is the adoption of a proactive culture. Such an approach often leads to variations in conventional safety practices to improve their effectiveness. So, it is received knowledge that the techniques that one uses to improve performance must be changed from time to time if they are to remain effective. It seems that this is not standard practice in Hong Kong and is again an issue which senior management and safety professionals must carefully address. The synergy which should exist between foreman and site safety officer appears to be absent in most cases.

H7 Foremen are willing to improve their safety supervisory performance

The vast majority of foremen indicated that they were both willing to attend safety supervisory classes and, in fact, believed that they needed to receive more safety supervisory training. The overwhelming impression given from the interviews and site studies was that foremen took their safety supervisory role seriously but were frustrated by both lack of knowledge and lack of authority in this area.

H8 Foremen's safety supervisory performance overall is poor

One might conclude that, overall, the safety supervisory performance of foremen in the Hong Kong construction industry is poor. However, this conclusion must be carefully considered. Although the results indicate that performance is not as good as it could be, this is not necessarily a failing of the foremen themselves. Consideration of the data shows that foremen are unclear as to what their responsibilities are, and also what their responsibilities should be. This stems, in part, from a lack of formal authority in many areas of site supervision related to safety. In addition, foremen generally believe that their safety knowledge and experience is limited and so this seriously impairs their ability to perform to high levels when it comes to site safety. All of these factors together point to a failure of the safety management system as implemented by their companies to properly train and educate foremen. Neither do they clearly define the foremen's roles and responsibilities, nor ensure adequate formal authority is given to foremen when it comes to safety matters. This is a failure on the part of senior management to adequately address the nature of the company's safety management

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system and, in particular, to address the problem of the interface between management and worker; the position in which the foreman finds himself. Recent work in small world theory postulates that information is disseminated through an organisation by means of "well-connected" nodes (Barabasi, 2002) in a network. Networks may take many forms, such as the Internet, the biotechnology network, a company's supply chain and so on: each is a network but with differing properties. In the situation discussed here the network is an information network, and the node, the foreman, is not being used effectively. However, the potential of the foreman in terms of instilling safety awareness and a positive safety culture is great and, by addressing the role of the foreman as a key node in terms of safety promotion, a great potential influencing network can be realised.

Further evidence

A number of foremen were concerned with the quality of workers being supplied by subcontractors, and one foreman said:

> Anybody, providing they can walk and breathe, can start working on a construction site as there is a serious shortage of construction workers at the moment.

Workers with little or no training and not having received a site induction are a high risk both to themselves and others. This problem was highlighted in a number of research investigations conducted in Asian countries. Rowlinson *et al.* (2000) note that workers are most prone to injury during their first four weeks on site.

Sub-contractors also provide supervisory problems. A number of foremen said that they had the problem of having inadequate authority to deal with disciplinary action for problem workers. Therefore, workers, especially the more experienced, would often resist because they knew that foremen would not fire them. In fact, most subcontract matters are negotiated at contract manager level and there is no emphasis on person-to-person communication or supervision. This is a structural issue that the industry needs to address.

A number of foremen said that, under many circumstances, they had the authority to stop unsafe acts on site, but they had no authority to transfer a worker out of their division or fire them, though this authority under many circumstances was, in their opinion, necessary. Undoubtedly, this would lead some foremen to feel powerless. Research studies have shown that powerlessness is positively associated with lack of job control coping (Ross and Reynolds, 1996). The foremen's only recourse was to report such cases to higher management or to the sub-contractors' representative on site and ask them to take action. This is an example of the negative influence that the economic basis of the sub-contracting system can have on safety performance. Several other characteristics of sub-contracting give rise to negative safety outcomes; this includes the "payment by results" system which is based on the amount of work not the time required, thereby encouraging subcontractors to minimise time and maximise profit. Furthermore, not all contractors are expected to be proactive in including sub-contractors in safety discussion, research conducted in Australia revealed that almost 40 per cent of surveyed contractors rate their proactiveness in this matter as average or below (Mohamed, 2000).

Conclusions

Foremen do not know precisely their responsibilities in going about their daily safety supervisory tasks. Although foremen knew their responsibilities in areas such as worker orientation, explanation of safe ways of operation, holding safety meetings and coaching workers, they were less well aware of their responsibilities in areas such as accident investigation, inspection for hazards and discipline issues with workers. In those areas where they had responsibility there was often a mis-match in the authority they were given to deal with these issues and their responsibility. This reflects a failure in the management system and foremen are really the interface between the management and the operational system. As such, foremen play a key role in ensuring that the safety management system operates effectively. It appears from the results of this study that this role is not being performed properly and that the interface associated with it is an area requiring urgent attention in many Hong Kong construction companies.

Foremen clearly indicated that they believed their knowledge was deficient in areas such as accident investigation, hazard inspection and safety policy. This result is

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hardly surprising as they are not given authority in these areas. These issues are left to the safety manager and senior management. It may well be that this is a key area to be changed in the Hong Kong construction industry. If foremen are given sufficient authority and training in these areas then potential exists for a significant improvement in safety performance. The reasoning behind this is that all three areas are intimately linked and, to reiterate, if accident investigation leads to identification of hazards, and subsequently changes in policy, then beneficial effects in terms of accident rates are likely to follow. As the foreman is the interface between worker and management the foreman has the best opportunity to ensure the identified hazards are eliminated.

Most foremen in Hong Kong believe that their main responsibility is for production. This attitude can cause numerous safety problems. In fact, besides safety officers and safety supervisors, foremen play a very important role in providing good safety supervision, as they know site conditions in detail at any time and are closest to the worker exposed to site hazards. Therefore, foremen should be encouraged to do more safety supervision and this must be made known to them through training, safety procedures and policy and through their employment contracts.

Management must take on board the issue of solving foremen's safety supervisory problems and at the same time revise their strategy in relation to foremen's work. What is required, at the minimum, is a tripartite effort from foremen, contractors' management and government to ensure safety supervision can be effective in Hong Kong. This necessitates a change of attitude by all of those involved in the process, along with the development of a positive safety culture.

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