

Developing and Implementing Contractors Safety Management Programme for Clients and Inspecting Engineers

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ABSTRACT: In Hong Kong, the building construction industry plays a major role in the economy. There are many construction sites where contractors are implementing their safety management system inadequately. It was observed that the problems / difficulties arise such inefficiency in implementation due to competitive tendering, extensive use of subcontractors, poor accident record keeping and reporting system, the low priority given to safety, inadequate safety training provided to contractors management and workers, etc. This paper identifies the role played by clients and inspecting engineers and describes the safety management programme developed and implemented by a public transport operator (client) for supervising and monitoring the safety performance of contractors.

1. INTRODUCTION

Hong Kong is a place with world famous infrastructures and construction projects since 1992 when the Government granted the green light to the construction of the new airport project and associated works. Nevertheless, it is frustrated that its safety records are still unsatisfactory – the average accident and fatality rate per 1,000 workers per year in the last ten years were 182 (ranging from 68 to 275) and 0.58 (ranging from 0.328 to 0.960) respectively (Labour Dept, 2004). The unsatisfactory safety record has been a matter of concern to the Hong Kong Government of SAR, the clients (project developers), and the public.

Recent studies (Ahmed et al, 1999) revealed that the major problem / difficulties of implementing site safety schemes were tight schedule of projects, inefficient communication due to multi-level subcontracting system, limited budget on safety investment, inability of safety officers to enforce safety regulations, etc. Other studies (Kartam et al, 2000) also revealed the similar problems.

In July 1995, the Manpower and Education Bureau of the Hong Kong Government issued a consultation paper on the review of industrial safety in Hong Kong. The paper encouraged a new safety management strategy, which emphasized on self-regulatory approach in safety management. The system basically follows the Quality Assurance System in which it asks the top management of construction firms to define, document and implement a safety management system which includes safety training, formation of safety committee, implementation of safety audit, setting up of safety benchmark, etc. Since then, a self-regulatory safety management system for the construction industry has been established.

As the rate of accidents in the Hong Kong construction industry remains at a high level and the costs of accidents, especially the social costs incurred by society, are substantial, there is no doubt that the Government, Clients and Contractors should increase their safety investment in construction projects to improve site safety (Ngai et al, 1999).

2. DEVELOPMENT AND IMPLEMENTATION STRATEGY

In view of the recognition of safety and health as one of the social accountability vested onto the clients (project developers) and to tackle the foregoing problems, one of a railway transport operator had developed a safety management programme for their directly employed inspecting engineers to supervise and monitor the safety performance of contractors during the routine overall supervision works.

In 1992, a safety management programme for supervising contractors were started to establish when the railway transport operator (thereafter “the Client”) was entrusted by the Hong Kong Government to construct a new airport railway and subsequently, the extensions of existing railway which included stations construction, tunnelling, marine works, viaduct construction, maintenance depots construction, and related electrical and mechanical works such as signalling, building services to stations, power supply system, tunnel ventilation system, main control system, platform screen doors, radio communication system, etc. A Project Management Team (thereafter the “Inspecting Engineer”) was then established by the Client to manage the new projects. The development and implementation of the safety management programme were based on the safety management practices and they were as follows:-

- Initial Status Review
- Safety Policy
- Safety Organizing
- Planning and Implementing
- Measuring Performance
- Management Review

2.1 Initial Status Review

Identification of Safety and Health Needs

General safety and health requirements were stipulated in the General Specification while specific safety requirements for individual contracts were stated in the Particular Specification. Various tender package preparation teams appointed by the Inspecting Engineer were set up and the Safety Advisors appointed by the Inspecting Engineer were also invited to review the adequacy of General Specification and Particular Specifications and to provide comment to the Inspecting Engineer if required. Final version of safety and health requirements including the submission of a safety plan and implementation of safety audit were then incorporated into the Specifications according to the nature of individual contracts. This was to enable the tenderers for allowing safety budgets during the tendering stage and construction period.

Pre-qualification and Tender Assessment Programme

Pre-qualification for all tenderers on safety issues were conducted to select qualified tenderers for further assessment. Qualified tenderers were then requested to provide their detailed safety management system, accidents and prosecutions records for detailed assessment. Shortlisted tenderers were invited to attend a tender interview for presenting their safety management system and verification of the submitted documents. Final tender assessment reports were then prepared for the Inspecting Engineer to select Contractors.

Inaugural Meeting and Initials Work Meeting

The Safety Advisors were invited by the Inspecting Engineer to attend the Inaugural Meeting and Initials Work Meeting before the commencement of each Contract and health and safety issues are one of the agenda. In these meetings, Contractors were briefed with the Client's safety policy and reminded to submit a detailed Safety Plan for approval from the Inspecting Engineer before commencing any site works and to appoint safety manager and safety officer(s) as required by the contract. Approval of the appointment of the safety staff was also required from the Inspecting Engineer.

2.2 Safety Policy

A Project Health and Safety Manual had been prepared by the joint efforts of the Safety Advisors and other staff from the Inspecting Engineer. Relevant legislation requirements and good practices were highlighted in the Manual for Inspecting Engineer and Contractors to implement. The Client's safety policy statement was also stated in the Manual that safety is the responsibility of everybody. The Inspecting Engineer and his site staff were requested to take immediate actions for any unsafe practices and conditions whenever identified on sites. Contractors were required to prepare their safety policy statement and the most senior officer in the company was required to sign on the policy statement for indicating his commitment to safety. The top management of Contractors was required to review the safety policy at least every 2 years. Relevant arrangements for the review were required to be clearly stated in the Safety Plan.

2.3 Safety Organizing

Safety Organization

Contractors were required to submit an organization chart and detailed safety responsibilities of all levels of staff. The responsibilities of Inspecting Engineer and his site staff were also clearly stated in the Project Safety and Health Manual.

Safety Committees

Four levels of safety committees were established to monitor and review the safety performance of Contractors:-

Construction Safety Management Committee

The Committee meetings were held monthly and chaired by senior staff of the Inspecting Engineer and attended by his senior site staff and Chief Safety Advisor.

Site Safety Management Committee

Inspecting Engineer from individual Contract was required to hold and chair the meeting monthly and attended by his site staff including Safety Advisors and the site management of Contractors.

Contractor's Site Safety Committee

All Contractors were required to establish their own Site Safety Committee and hold the meeting monthly with their senior site staff and subcontractors. Inspecting Engineer from individual contract or Safety Advisors were normally attended the meetings to provide comments and monitor the effectiveness of the Committee.

Safety Advisors Monthly Meetings

Monthly meetings were held amongst various Safety Advisors from individual Contract. The safety performance of Contractors and other safety-related issues were discussed and views were brought to the Construction Safety Management Committee through the Chief Safety Advisor.

Safety Training

Contractors were required to conduct regular induction training courses for new workers (and at every 6 months), regular tool box training and specific safety training courses to workers according to their trades. The safety training activities of Contractors were monitored by attending their safety training courses as observers and through regular various safety committee meetings. The Safety Advisors also conducted regular documentation checks on Contractors safety training records and Contractors were also required to prepare and submit safety training package on various topics for approval. Regular internal safety training courses were also conducted by the Safety Advisors to the site staff of Inspecting Engineer for strengthening their safety knowledge and awareness.

Safety and Health Promotion

Safety Awards for Contractors were organized by the Inspecting Engineer at every 3 months to promote Contractor's safety awareness. Safety seminars and safety talks to both Contractors and Inspecting Engineer's site staff were regularly held. Safety booklets, leaflets etc. were placed in the site offices for reference to site staff. Contractors were required to prepare Safety Newsletters / Bulletin or related materials for distribution to their workers on monthly basis.

2.4 Planning and Implementing

In-house Safety Rules & Regulations

Contractors were required to prepare all relevant safety rules and procedures including permit to work system, etc. for high risk activities. Contractors were also

required to comply with the Client's in-house safety procedures when working at or near the existing operating railway.

Job Hazard Analysis

Contractors were required to submit detailed risk assessment report for major construction activities together with method statement. Comments from the Safety Advisors were issued to Contractors through Inspecting Engineer for further amendment before approval was given.

Personal Protective Programme

Contractors were required to develop a personal protective programme. The use of personal protective equipment by Contractors were monitored through regular various safety committee meetings and regular safety inspections with Contractors.

Emergency Preparedness

Contractors were required to develop the emergency procedures for various situations such as typhoon, fire, serious accident, flooding, adverse weather, etc. Contractors were required to regularly conduct emergency drills on various situations.

Health Assurance Programme

Contractors were required to prepare the health assurance programme to tackle ventilation, lighting, noise, use of chemicals, exposure to radiation, etc. Health risk assessment reports and others such as noise assessment report etc. conducted by Contractors were required to be submitted to the Inspecting Engineer for comment and record. Safety Advisors had also conducted various health risk assessments and monitoring activities to verify the effectiveness of control measures taken by Contractors.

Evaluation, Selection and Control of Subcontractors

Contractors were required to provide detailed arrangements how to evaluate, select and control their subcontractors. These included provision of Contractor's Safety Plan, pre-work meeting, attending Contractor's Site Safety Committee Meetings, participation in regular safety inspections, safety performance assessment, etc.

Process Control Programme

Contractors were required to conduct a detailed risk assessment pertaining to the health and safety aspects of the whole contract and to prepare safe working procedures in the Safety Plan. Contractors were also required to submit a detailed risk assessment report for all major construction activities. Safe working procedures for particular site activity were then developed according to the results of the risk assessment. Approval of the risk assessment from the Safety Advisors was required before commencing the work. All Inspecting Engineers and their site staff have a duty to take appropriate action on Contractors if unsafe practices and conditions were noted. Any repeated items were to be discussed in the Inspecting Engineer's Site

Safety Management Committee meetings. Contractors were also required to prepare specific accident control programmes for particular site activities such as Fire Safety Plan for works near existing operating railway and Bored Tunnel Safety Plan for tunnelling works.

2.5 Measuring Performance

Safety Inspection Programme

Formal joint safety inspections with senior site management of Contractors and Safety Advisors were conducted on weekly basis. Joint daily safety inspections with Contractors and Inspecting Engineer's site staff on high risk activities were also conducted. Contractors were required to rectify the unsafe practices and conditions within the agreed due date. Follow-up joint inspections were also required to verify the completed items. Contractors were also required to carry out their own regular inspections for continuous monitoring.

Accident / Incident Investigations

Contractors were required to report any serious or fatal accident immediately to the Inspecting Engineer and a written preliminary report was required to be submitted within 24 hours. Contractors were also required to submit a full accident investigation reports with recommendations of corrective action for each accident within 5 days. Reports on follow-up actions taken were also reviewed during the various safety committee meetings.

Implementing Improvements to Overall Safety and Health Programmes

Safety Performance Measurement Audit was developed by the Safety Advisors for measuring the safety performance of Contractors. The Audits were regularly conducted by the Safety Advisors in accordance with the contract requirements and Schedules of Milestones which were both specified in the Particular Specification. Contractors were required to submit a Corrective Action Plan for approval before conducting verification audit by the Safety Advisors. Payment for that particular milestone would be suspended if the result of the verification audit was unsatisfactory. Contractors were also required to carry out their own internal safety audits at every 3 months for reviewing their safety management system and implementing continual improvement.

2.6 Management Review

The safety performances of all Contractors were regularly reviewed by the senior management of the Inspecting Engineer through:-

- Safety Management Committee;
- Site Safety Management Committee for individual Contracts;
- Safety Advisors Monthly Meetings.
- Safety Performance Measurement Audits

Closure Report was prepared by individual Safety Advisor for each Contract after the contract completion according to Inspecting Engineer's procedure to review the overall performance of Contractors and the whole project management system for evaluating the effectiveness of Safety Management Programme. The Closure Reports were kept for future reference when selecting Contractors for future projects.

3. DISCUSSION AND CONCLUSIONS

The foregoing safety management programme stipulated in the contracts provides Contractors to consider safety costs in their tender and re-rank the priority of safety to highest level. It also facilitates the Inspecting Engineer and his site staff to supervise and monitor Contractors' day to day safety performance during the routine supervision works. Safety Advisors, whose major duty was to provide advices to Inspecting Engineer on safety and health aspects, also participated in the supervision work through conducting regular safety inspections, attending various site safety committee meetings, control of method statements and risk assessments, conducting safety promotional activities and milestone safety audits, etc.

Initial problem areas for Contractors were the communications of the contractual safety requirements from the Contractors to subcontractors and down to their workers. These problems were overcome by conducting pre-work safety meetings, induction safety training courses, regular toolbox safety training talks, through their site safety committee meetings and safety promotional activities.

The other problems arose in the later construction stage were the safety co-ordination works between civil Contractors and electrical & mechanical Contractors and amongst electrical & mechanical Contractors as both Contractors were working at the same construction sites. Based on the partnering approach (Rowlinson, et al, 1999), a Safety Co-ordination Committee, which was initiated by the Inspecting Engineer and Safety Advisors, was set up and meetings were held on monthly basis. The meetings were attended by the senior safety staff of all Contractors to enhance the communication and to solve the safety interface issues as well as seek for utilization of common safety resources when working at the same locations such as working inside confined spaces and the use of working platforms.

The milestone safety audit arrangement, which was the precursor in the industry, also played a major role in the Safety Management Programme for supervising Contractors as it related to milestone payment and their business goodwill.

While the overall safety performance of Contractors for the foregoing railway project was satisfactory (about 30 accidents per 1,000 workers per year), we still need to enhance the performance and safety culture (Tam, et al, 1999 and Tang, 2001) of other Contractors working for private sector clients.

Improving site safety through partnering and sociological approach may be another issue to be further developed in the future strategy.

REFERENCE

“Occupational Safety and Health Statistics Bulletin”, Issue No. 4 (July 2004), Occupational Safety and Health Branch, Labour Department, Hong Kong Government of SAR, China.

Ahmed, S.M., Tang, S.L., and Poon, T.K. 1999. “Problems of implementing safety programme on construction sites and some possible solutions (Hong Kong experience)”, Implementation of Safety and Health on Construction Sites, Singh, Hinze & Coble (eds), Balkema, Rotterdam.

“Consultation Paper on the Review of Industrial Safety in Hong Kong” Education and Manpower Bureau, Hong Kong Government, 1995.

Kartam, N.A., Flood, I., and Koushki, P. 2000. “Construction safety in Kuwait: issues, procedures, problems, and recommendations”, Safety Science 36, 163-184.

Ngai, K.L., and Tang, S.L., 1999 “Social Cost of construction accidents in Hong Kong”, Implementation of Safety and Health on Construction Sites, Singh, Hinze & Coble (eds), Balkema, Rotterdam.

Rowlinson, S.M. and Matthews, J. 1999, “Partnering: Incorporating safety management”, Implementation of Safety and Health on Construction Sites, Singh, Hinze & Coble (eds), Balkema, Rotterdam.

Tam, C.M., and Chan, A.P.C., 1999 “Nourishing safety culture in the construction industry of Hong Kong”, Implementation of Safety and Health on Construction Sites, Singh, Hinze & Coble (eds), Balkema, Rotterdam.

Tang, Henry, 2001, “Construct for Excellence – Report of the Construction Industry Review Committee”, Hong Kong Government of SAR, China, 130-137.

“General Specification”, “Particular Specification” and “Project Health and Safety Manual”, Project Division, MTR Corporation Ltd., 1992 and 1997.