

Safety Performance in the Egyptian Construction Industry

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Abstract: This study presents the results of a questionnaire survey that was conducted among a selected sample of large-size contractors operating in Egypt, as well as a comparison of the safety approaches in both the United States and Egypt. The results revealed that safety programs applied by large-size contractors in Egypt were less formal than those applied by their American counterparts. Only a few companies out of the surveyed sample had accident records broken down by projects and provided workers with formal safety orientation. Finally, the study recommended that reforms in the way of the employer's contribution to social insurance were necessary; thereby linking accident insurance costs to the contractor's safety performance. This is meant to serve as a strong incentive for safety management.

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Introduction

Fang et al. (2004) identified key factors that improve safety management. Based on this benchmarking study, a practical safety assessment method was implemented on six construction projects. A study by Evelyn et al. (2005) revealed that site accidents were more likely to happen when there were inadequate company policies, unsafe practices, poor management commitment, and insufficient safety knowledge and training of workers. Barrie and Paulson (1992) addressed the saving benefits of managing safety. These authors concluded that for each dollar invested in safety, a US\$4–8 saving can be expected. This implied that a properly implemented safety program at least would pay for itself. Finally, this technical note aimed at investigating the current safety environment in the Egyptian construction industry. To this end, a questionnaire survey was conducted among a selected sample of large-size contractors operating in Egypt, as well as an extensive review of the safety laws in both the United States and Egypt.

Selected Sample

The following criteria were set for the contractors' selection:

- Type of work: to get a broad sample, the selection included building, industrial, and specialty contractors; and
- Company size: the study focused on the category of contractors designated as "large-size," i.e., contractors with annual volumes of work greater than US\$100 million. The rationale

was that large contractors tended to have a high degree of safety awareness, thus providing a clear image about the safety environment in Egypt.

Consequently, the surveyed sample consisted of 35 large-size construction firms. These were Egyptian as well as international contractors located primarily in Cairo.

Questionnaire Composition

A questionnaire was used in personal interviews with the safety director or the safety engineer of the 35 firms selected for this study. It was modeled after a prior study (Hinze and Harrison 1981) that surveyed the nature of safety programs applied by large-size construction firms in the United States. Although the study by Hinze and Harrison was outdated, it was used as a guideline for constructing the questionnaire applied for this research due to its simplicity, which matched the novelty of the subject matter within the Egyptian construction industry. Further, the questionnaire was modified to better suit the Egyptian environment and the time lag between the two studies.

The questionnaire comprised more than 30 questions, which included both project-level safety practices and the company's policies at the corporate level. The questions elicited either short or multiple-choice responses.

Data of American and Egyptian Safety Approaches

Actually, the American safety approach served as a good yardstick against which the effectiveness of the Egyptian approach could be evaluated, regardless of the fact that the Occupational Safety and Health Administration (OSHA 1985) provided the minimum requirements of safety measures on construction sites. Further, one should not lose track of the fact that in the United States, OSHA is but one aspect of a company's safety program. Companies, in general, are known to adopt additional various specific programs of their own that directly impact safety performance on their projects.

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In essence, the following issues concerning both approaches were scrutinized:

- Safety rules and regulations as exemplified by OSHA (1985) and the Egyptian Labor Law (MLFT 1981);
- Record keeping requirements;
- Site inspection;
- Fines and penalties; and
- Safety performance measures.

Results

Analysis of Questionnaire Data

Due to the limited number of respondents, no statistical technique was applied; only a simple analysis was performed.

Physical Examination of Workers

Ninety percent of respondents required potential employees to take a physical examination as a prerequisite to employment. Factors considered in work assignments were strength, endurance, and visual and hearing acuity.

Personal Protective Equipment

All respondents indicated that free hard hats were issued to all workers, while 90% required free safety glasses to be worn on job sites.

Safety Orientation

Twenty percent of the firms provided workers with informal orientation. Another 20% gave workers formal orientation. In 20% of the firms, the foreman was responsible for new worker orientation. The remaining percentage provided workers with no orientation.

Toolbox Meetings

Questions inquired whether these meetings were held on job sites and the frequency of these meetings. Eighty percent of the firms conducted regularly scheduled toolbox meetings. They were held to emphasize the project's safety requirements, discuss the causes of accidents in a particular craft and ways of preventing future accidents, and provide pertinent safety training and motivation. Thirteen percent of the firms conducted daily toolbox meetings. Another 13% held weekly meetings. The remaining firms reported less frequent meetings, i.e., monthly.

Company Organization

Respondents were asked whether the company had a full-time safety director at the corporate level. Ninety percent stated that they had such a position. Respondents were then asked about the designated managerial position to which the safety director reported. While 13% of respondents reported to the president, 9% reported to the site manager and 78% to the project manager.

At the job level, the safety director counterpart was the field safety director (safety representative). Each respondent was asked to specify the number of safety representatives employed by his company. In most instances, the company employed one safety representative for each project. In very few instances, two safety representatives were employed. This may be linked to the number of workers, job needs, or job complexity. Consequently, respondents were asked whether the safety representative was hired by the safety director and whether he reported to him or not. In almost 60% of the responding firms, the field safety director was

hired by the corporate safety director and reported to that position. A study by Eich (1996) demonstrated that the establishment of dedicated safety positions contributed to better safety performance.

Contractors were then asked about the criteria used in determining whether a full-time safety representative was to be employed on a particular job. Sixty percent of the firms tied the criteria to particular job needs, and 40% used the number of workers on the job as a determining factor. For the latter category, 10% placed a full-time safety representative on the project as soon as 100 workers were on the job, while the remaining 30% used the number of safety representatives specified by the labor law as their reference, which was one safety representative for every 50–200 workers.

Respondents were asked whether they conducted safety meetings for the safety representatives or not. Seventy percent of the respondents conducted safety meetings for their representatives. These meetings were held periodically, ranging anywhere from weekly to annually.

Safety representatives were required to have special training through attending seminars or special classes. In 60% of the firms safety representatives had special training. Only in 20% of firms safety representatives were certified in first aid.

The last couple of questions addressed whether or not safety directors trained workers and safety representatives. Seventy percent of the firms stated that safety directors trained workers under their supervision. Forty percent stated that safety directors trained their subordinate safety representatives.

Safety Meetings for Supervisors

Supervisors are the key to the safety program success. Two effective means for realizing this are holding safety meetings for supervisors and rewarding supervisors with outstanding safety records. The former item, typically, was asked to all the firms. Eighty percent of the respondents held separate safety meetings for supervisors.

Safety Personnel Authority

Respondents were asked whether the safety personnel could stop work that was deemed unsafe. Nearly all respondents confirmed that they gave such an authority to the safety personnel.

First Aid Personnel

All respondents indicated that they had first aid personnel, i.e., those providing first aid services on site. On average, each company had two full-time first aid personnel.

Safety Inspections

Companies were asked whether anyone from the headquarters also made periodic job site inspections. Such visits were made by home office personnel in 70% of the firms. In 86% of these instances, inspections were made by the company safety director. In only 14% of firms were the inspectors representatives from the safety department. Several respondents indicated that these inspections occurred quarterly, while others reported less-frequent visits.

Safety Inclusion in Site Visits

Top managers must continue to be involved in the safety program, thereby discussing safety along with other topics when job site visits were made. This practice was common in 60% of the firms. Questions about past accidents, ways to remedy hazards or com-

ments about the safety environment of the project, all served to convey the message that top management cared about safety.

Awards for Good Safety Performance

To increase safety awareness, companies may employ awards for various company personnel. Awards can be either financial or nonfinancial, based upon freedom from lost-time injuries or some other measure of safety performance. Only 30% of respondents gave their personnel safety awards. In most instances, rewards were given to the highest level field personnel. Only a few firms included safety personnel in these awards. However, a study by Eich (1996) found that safety incentives were associated with safer performance.

Safety Budget

Annual allocations should be made in the budget for the various aspects of the safety program. However, very few contractors responded to the question on the annual percentage spent on safety. Out of these responses, approximately 0.5–1% of the annual dollar volume was spent on safety.

Allocation of Safety Expenses

Safety expenses are best charged to the corporate overhead. This practice was encouraged as an attempt to encourage managers to spend on their safety programs. Consequently, supervisors would not be reluctant to spend more money on safety, resulting in fewer accidents on their projects. For this survey, none of the firms allocated safety expenses to the company overhead. Rather, they were charged to individual projects.

Safety Performance Measures

This study did not aim at evaluating the effectiveness of the safety program aspects. Therefore, the responding firms were not obliged to apply a unified measure of safety performance. Along this line, each contractor was asked to provide his own subjective safety performance measure(s). Contractors have developed these measures as a means of tracking the company performance over a number of years. These measures were either a frequency measure, which is based on the number of accidents, or both frequency and severity measure. A severity measure, on the other hand, is based on the number of lost days.

Safety Incorporation in Progress Meetings

Incorporating safety in progress meetings demonstrates how planning can improve safety. Reviewing safety during these meetings makes safety problems anticipated beforehand. 60% replied that safety was reviewed in progress meetings.

Accident Reports

Each contractor was first asked whether the company had a standardized accident report form. Nearly all respondents indicated that they had such a report. This report was filled and submitted after any accident involving death or serious injury to contractor's personnel.

Second, contractors were asked whether accident cost reports were broken down by projects or not. Only 10% of the firms indicated that accident cost reports were broken down by projects. This practice was observed by all American firms as a standard company policy (Hinze and Harrison 1981) for generating accident cost awareness and showing true profitability. However, this is still not the case for this survey. This may be attributed to the differences that exist in handling accident costs between American and Egyptian approaches.

Further, respondents were asked about the distribution frequency of accident reports from the job site to the corporation level. While 70% of the respondents indicated that accident reports were forwarded from the job site to the corporation level on a monthly basis, 30% reported less-frequent distribution.

In order to make a closer assessment of top management involvement in safety, particularly at the presidential level, contractors were asked to define who reviewed accident reports in the home office. Responses revealed that in none of the surveyed firms accident records were reviewed by the president.

Finally, contractors were asked whether there was a corporate accident report provided to all jobs. Only 10% of the respondents stated that they had such report. It is worth mentioning that such a report served the dual function of showing superintendents how their projects were performing in safety in relation to others and of showing superintendents that top management was aware of safety.

Interpretation of Results

As per Fig. 1, some safety practices were prevalent among the surveyed sample, such as physical examination of workers, toolbox meetings, safety orientation, and safety meetings for safety representatives. The predominance of the above practices could be linked to the fact that they are the fundamental elements of any safety program, in addition to the requirement of most of them by the Labor Law (MLFT 1981).

At the other end of the scale, the least-prevalent practices were formal safety orientation, training of safety personnel in first aid, awards for good safety performance, accident cost reports, and allocating accident costs to the company overhead with a surprising 0%. It is worth mentioning that these practices were more specific, thus increasing the costs of the safety program. In most instances, such practices were applied in complex projects by international contractors who were extremely aware of their performance as it might affect their reputation for bidding on future projects internationally.

These nonprevalent practices are indicative of the formality of any safety program (Hinze and Harrison 1981). However, the reasoning for their nonpredominance is that applying a more costly and sophisticated safety program, i.e., a formal program, would not affect the contractor's insurance costs. Accident insurance costs in Egypt are not contingent upon the contractor's performance, rather they are fixed, amounting to approximately 18% of labor cost. Therefore, applying a formal safety program will simply be an added cost rather than contributing to a decrease in accident insurance cost.

Comparison of American and Egyptian Safety Approaches

Table 1 summarizes the differences between both approaches:

Safety Performance Measures under OSHA and the Egyptian Labor Law

An analysis of the measures developed by both agencies reveals obvious differences among them. Under OSHA, several safety performance measures can be calculated for each individual contractor, namely, the experience modification rating (EMR), the OSHA incidence rate, and measures for supervisory accountability.

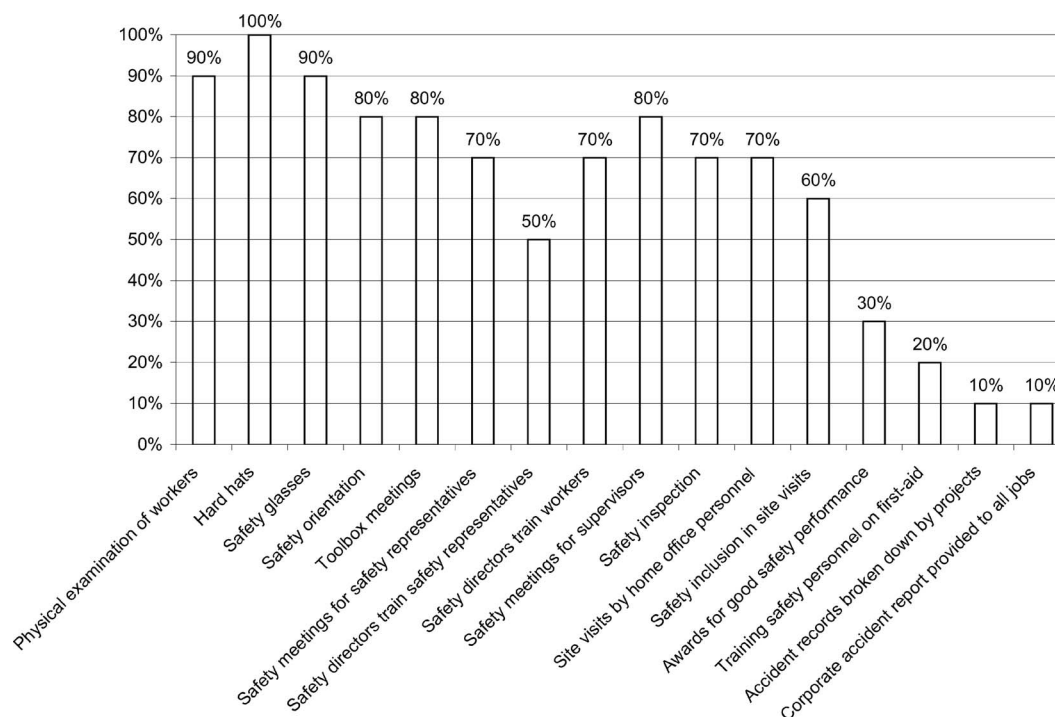


Fig. 1. Contribution of safety practices to the safety program

Table 1. Summary of Differences between American and Egyptian Safety Approaches (Adapted from Suazo and Jaselskis 1993)

Issue	Safety approach	
	American (OSHA 1985)	Egyptian (MLFT 1981)
Rules and regulations	<ul style="list-style-type: none"> Detailed and comprehensive; give an in-depth engineering knowledge of specific work methods and safe sequencing of activities 	<ul style="list-style-type: none"> Inadequate provisions
Administration	<ul style="list-style-type: none"> A fully dedicated administrative authority (U.S. Department of Labor) 	<ul style="list-style-type: none"> Enforcement of the Labor Law provisions, as pertaining to safety is added to the duties of the Ministry of Labor Force and Training, which is a common problem in developing countries (Suazo and Jaselskis 1993)
Employers' responsibilities	<ul style="list-style-type: none"> Guarantees employers' responsibilities 	<ul style="list-style-type: none"> Few employers' responsibilities are guaranteed; employers are not responsible for informing employees about safety issues, standards and record keeping requirements
Employees' rights	<ul style="list-style-type: none"> Guarantees employees' responsibilities 	<ul style="list-style-type: none"> Few employees' rights are guaranteed; employees cannot exercise their safety rights or request inspection, and cannot comment on standards
Record keeping requirements	<ul style="list-style-type: none"> Every employer employing 10 workers or more keeps detailed information concerning each individual accident Accident records are posted on work sites The Bureau of Labor Statistics compiles nationally an OSHA incidence rate for about 14 separate classifications of construction work and five to eight employee-size groupings 	<ul style="list-style-type: none"> Employers employing 15–49 workers do not maintain detailed information concerning individual accidents; they summarize injuries, illness and grave accidents that occur in the firm during the preceding six months period using a specific statistical statement Employers employing more than 50 workers provide detailed information on individual accidents using a specific statement Accident statistics are not posted on work sites Typical accident data do not provide cost or accountability information
Site inspection	<ul style="list-style-type: none"> Actual inspections are carried out on active sites; during inspections, citation of violations are issued 	<ul style="list-style-type: none"> No inspections are carried out by the industrial safety offices to ensure the enforcement of safety provisions
Fines and penalties	<ul style="list-style-type: none"> High civil penalties ranging from \$5,000 to \$70,000 (U.S. dollars) per violation 	<ul style="list-style-type: none"> Inadequate civil penalties ranging from \$4 to \$9 (U.S. dollars) per violation

Under the Egyptian Labor Law, two safety performance measures are calculated for the construction industry sector, namely, a frequency measure that uses the formula

$$\text{Frequency rate} = \text{number of injuries during the year} \\ \times 1,000,000 / \text{number of workers} \times 2,400 \quad (1)$$

where 2,400 represents the number of work hours for each worker during the year; and 1,000,000=number of hours worked.

The severity measure that uses the formula

$$\text{Severity rate} = \text{number of lost days} \times 1,000 / \text{number of workers} \\ \times 2,400 \quad (2)$$

where 1,000 represents the number of workers.

Therefore, contractors operating in Egypt cannot be compared on the basis of accident frequency or severity because, as mentioned above, safety measures are developed for the whole construction sector rather than individual contractors.

Conclusions

Safety programs applied by large-size contractors operating in Egypt are less formal than those applied by American contractors. The reasoning is that applying a formal safety program will neither affect the contractor's safety performance nor reduce actual accident insurance costs. All contractors are charged with the same percentage for their accident insurance costs regardless of their safety record.

The study concluded that safety programs applied by contractors operating in Egypt have to be more formal; recommending countries like Egypt, where accident insurance costs are fixed irrespective of the contractor's performance, to study the feasibility of linking accident costs to the contractor's performance. This way, contractors will act on improving safety programs, resulting in safer performances and consequently, lower insurance costs.

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