

# Perception of Contracting Parties on Construction Safety in the Gaza Strip, Palestine

إدراك أطراف تعاقد الإنشاءات والتشييد من المقاولين والاستشاريين  
والعاملين للأمان في مشاريع التشييد في قطاع غزة، فلسطين

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**ABSTRACT:** The construction industry is one of the most hazardous industries in developing countries. Understanding the safety climate or culture of a workplace, the perceptions and attitudes of the workforce are important factors in assessing safety needs. The construction industry in Palestine, by its inherent nature, is susceptible to potentially dangerous conditions that affect the safety of all personnel working in construction projects. This paper reports, based on a questionnaire survey, the perception of owners, consultants, and contractors towards safety in constructions in the Gaza Strip. The results showed that, most of the participants in the survey had accidents in their construction projects. The findings indicated that, the main causes of fatalities and injuries are falling from heights, dropped objects and materials, and being caught under excavations. Carelessness of workers, lack of safety knowledge, and lack of safety training are the main three reasons that contributed to the increase rate of accidents among construction workers in the Gaza Strip. Therefore, contractors should prepare safety training programs which help personnel to carry out various accidents preventive activities effectively. Training material should discuss the costs of accidents, the influence of good safety performance, and should stress the safety objectives of the company, the relevant laws and legislation, and contractual relationships with clients regarding safety matters.

**Keywords:** construction, contracting, safety, accidents, regulation, perception, Palestine.

**المستخلص:** تعتبر صناعة الإنشاءات من أكثر الصناعات خطورة في العالم الثالث، نسبةً لمحدودية فهم بيئة وثقافة الأمان في مكان العمل وكذلك موقف ووجهة نظر العاملين، والتي هي من أهم العوامل في تحديد احتياجات الأمان. على هذا تعتبر صناعة الإنشاءات في فلسطين بطبيعتها الحالية ذات مؤثرات خطيرة على سلامة العاملين في مشاريع التشييد. اهتمت هذه الدراسة بوجهات نظر المالكين والاستشاريين والمقاولين نحو ظروف الأمان في مشاريع الإنشاءات في قطاع غزة، حيث خلصت الي أن لمعظم المشاركين في الاستبيان حوادث وإصابات عمل في مشاريع التشييد. كما أظهرت الدراسة أن من أهم الأسباب المُتسببة في إصابات العمل هي سقوط العاملين والأدوات والمواد المستخدمة في العمل من المواقع العليا، فضلاً عن حالات الانحدار في أماكن الحفر بموقع المنشأة، مما قد يعني خصلة الإهمال في العاملين وتواضع معرفتهم بمتطلبات الأمان وضعف التدريب والتي تشكل عاملاً من أهم مسببات الازدياد في نسبة الحوادث بين العاملين في مشاريع التشييد في قطاع غزة. توصي الدراسة بضرورة تنظيم المقاولون لدورات تدريب للعاملين ورفع الوعي لديهم لتوخي احتياطات الأمان والسلامة وفهم التشريعات واللوائح السائدة لسلامة بيئة العمل وضمانات حقوق العاملين حالات الإصابة.

**كلمات مدخلية:** صناعة الإنشاءات، تعاقد، الأمان، الحوادث، اللوائح، الضمانات، إدراك.

## INTRODUCTION AND BACKGROUND

Construction has been found to be the most hazardous occupation, claiming nowadays most of the workplace injuries and fatalities worldwide (Kisner, *et al.* 1994). A number of factors may account for the risks on construction sites. Most of the work is done at heights with standing on unstable scaffolding with many heavy mobile machines in use that might endanger the people on the job. Most employees are from poor social backgrounds, sometimes with poor communication ability and employed by dubious companies. Little concern is shown for safety issues, because of low marginal profits. Workers are under-pressure to complete their assignments at the lowest cost in order to increase the contractors' revenues (Yanai, *et al.* 1999).

Safety on the job site is an important aspect of the overall safety in construction. Construction sites are in a constant state of change, dictating frequent inspections. The safety performance of the company should be measured so that unsafe conditions and practices can be identified. There are several methods of measuring the safety performance on a jobsite. One way is by conducting a safety audit. A comprehensive audit is basically a revision of all aspects of the company's safety program. A properly conducted safety audit will determine the strengths and weaknesses of the current safety measures (Jannadi, *et al.* 1998). The construction industry in Palestine, by its inherent nature, is susceptible to potentially dangerous conditions that affect the safety of all personnel working on construction projects.

Statistics of the Ministry of Labor in the Gaza Strip (2003) showed that 19.5% of employees in the Gaza Strip were injured through working in construction projects during the last six years, and 80.5% were injured in other industries such as manufacturing, agriculture, and services. Enshassi (2003) found that the majority of construction managers recognize the benefits of safety improvement on reducing accident costs, increasing productivity, improving human relation, and enhancing firms' image. In addition, he illustrated the factors affecting the construction safety on Gaza Strip, such as the severe competitive tendering methods,

the age of the workers, their experience, the concern of management on productivity with ignorance of safety issues, and the lack of training. Unfortunately, there was a shortage in safety applications in the Gaza Strip construction industry. The safety culture for managers, superintendents, workers and all who work in the construction should be improved. The objective of this paper is to study the perception of owners, consultants, and contractors towards safety in construction projects in the Gaza Strip.

Understanding the safety climate of a workplace, the culture perceptions and attitudes of the workforce are important factors in assessing safety needs. Safety solutions may fail if they do not take into account these prevailing attitudes and perceptions of contracting parties in the construction industry. Furthermore, changes in attitudes and perceptions about safety are often likely outcomes of safety interventions (Williamson, *et al.* 1997).

One of the best ways to avoid injuries and minimize costs is through good planning and coordination, both before and during the execution of the job. This should start when the decision is made to go ahead with the project, and should consider all stages and parties associated with the work (OSHA, 1999). Effective planning for health and safety is essential if projects are to be delivered on time, without cost overrun, and without experiencing accidents or damaging the health of on the site personnel. These are not easy objectives as construction sites are busy places where time pressures are always present and the work environment ever changing (Cameron, *et al.* 2000). Safety management relates to the actual practices, roles and functions associated with prevailing safe issues (Mearns, *et al.* 2003). Safety management is taken to be the total of activities conducted in a more or less coordinated way by an organization to control the hazards presented by its technology. These hazards may be potential harm to its assets (damage to buildings, plant, etc), its work force, its customers or those living in the vicinity of the sites (Hall, 2003).

Hinze (1997) found that in most of the projects, firms with better safety records were those employing full-time safety officers with reasonable authority and when full-time safety

officers were assigned: Hinze, *et al.* (1998) believed that safety incentives are designed to influence workers actions so that safer performance is encouraged and rewarded. Tam, *et al.* (2004) indicated that poor safety awareness of firm's top leaders and of project managers were the main factors affecting construction safety performance in China. In Hong Kong, survey study results of Poon, *et al.* (2003) indicated that management involvement in safety is significantly correlated with the site accident frequency rate. Furthermore, the average site accident frequency rate is exceptionally good when the top management is directly responsible and accountable for safety in the work site.

Levitt and Samelson (1993) stated that successful companies are those adopting the following practices: Include safety considerations in sub-contractor contracts and require contractors to provide detailed work plans; Designate a safety director for each site; Regularly inspect sites and protective equipment; Hold weekly safety training sessions and train new employees; Systematically conduct detailed accident investigations; and Perform daily safety audits or similar controls, and take the time to hold toolbox safety talks.

## METHODOLOGY

This research was conducted by means of a questionnaire survey. One hundred and ten forms of questionnaire were sent out to construction contractors, consultants, and owners (category A, B, and C, respectively). Overall, 60 questionnaires were distributed to contractors, 30 to owners and 15 to consultants. Out of the 105 questionnaires, 83 responses were received from all the three parties; 50 responses by contractors, 20 responses by owners and 13 responses by consultants were used in analyzing the questionnaire. Hence, the ultimate response rates were 83% for contractors, 67% for owners and 87% for consultants. Descriptive analysis was used in this study.

Three types of populations were considered in this study. The first type of population was the contracting companies. The contractors companies had valid registration according to the Contractors Union records. All contractors in Gaza Strip are

divided into five major categories depending on their sizes, capitals, executed projects, equipments values, and qualifications of their technical staff as per the rules and regulations of the Union of Contractors in the Gaza Strip, where class 1 designates the largest contractors and class 5 designates the smallest. Class 5 of contractors were neglected because they didn't execute projects more than 100,000 US\$, and most of them are very new companies that didn't have sufficient experience in constructions. The second type of population was all consultants in category (A) and they are fifteen offices according to the Engineering Syndicate in the Gaza Strip. This category has at least five engineering disciplines, namely Civil, Architect, Mechanical, Electrical, and Infrastructure, and have executed a number of construction projects during the last five years. The third type of population was the owners. Thirty owners were selected to represent the main owners in the Gaza Strip such as municipalities, ministries, UNRWA, and other governmental authorities. The sample was selected randomly from each type of construction professionals (contractors, consultants and owners).

## RESULTS

### Positions of Respondents

Figure 1 shows that 32% (27) of the respondents were project managers, 24% (20) site engineers, 22% (18) supervisor engineers, 17% (14) were company presidents, and 5% (4) were executive managers. Out of 14 company presidents who responded to the survey, 12 of them were contractors and 2 were consultants. Moreover, 36% (18) of the responding contractors, 38% (5) of the responding consultants, and 35% (7) of the responding owners who participated in the survey were project managers. Furthermore 36% (18) of the responding contractors were site engineers, while 46% (6) of the responding consultants and 55% (11) of the responding owners were supervisors. 5% (4) of the respondents were executive managers. The survey included mainly persons who had a large experience in construction fields because they dealt directly with hazards and all other safety issues in construction sites.

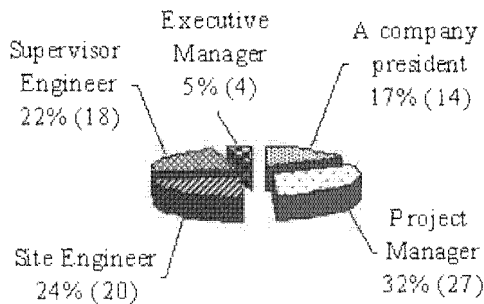


Fig. 1. Positions of Respondents.

### Year of Establishment

Table 1 shows that 48% (40) of the respondents firms were established before 1995, 33% (27) established between 1995 to 2000, while only 19% (16) were established after the year 2000.

Table 1. Company Establishment year.

Date of Establishment	Contractor	Consultant	Owner	Average
Before 1995	32% (16)	85% (11)	65% (13)	48% (40)
1995-2000	40% (20)	15% (2)	25% (5)	33% (27)
2000-2003	14% (7)	-	10% (2)	11% (9)
After 2003	14% (7)	-	-	8% (7)
Total	100% (50)	100% (13)	100% (20)	100% (83)

The results showed that 68% (34) of contractors, 15% (2) of consultants, and 35% (7) of owners were newly established and have less than 10 years of experience in constructions works in the Gaza Strip (Figure 2). The average percentage of the newly established companies (less than 10 years of experience) was 52% (43) among the three groups of construction professionals (contractors, consultants, and owners).

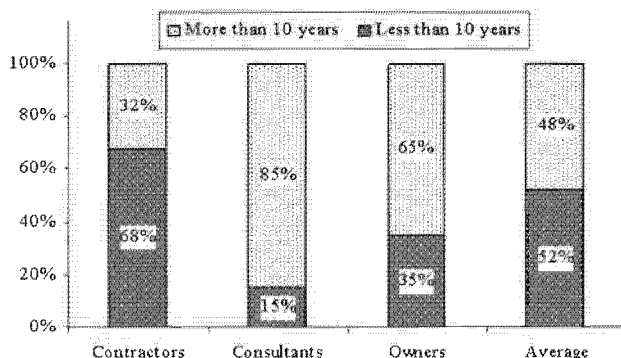


Fig. 2. Experience of the Respondents' Organizations.

### Number and Value of Executed Projects during the Last Five Years

As demonstrated in Table 2, the majority of consultants and owners executed more than 10 projects with values more than three million dollars during the last five years (Table 3); 34% (17) of contractors executed less than 10 projects with 20% (10) of them had projects valued less than 0.5 million dollars during the last five years. These high percentages (34% and 20%) who executed less than 10 projects with values less than 0.5 million dollars are attributed to two main reasons. The first was due to the high numbers of the new established contracting companies. The second is due to the current political situation caused by Al Intifada, which contributed in reducing the numbers and the values of the construction projects. However, most of the participated organizations in the survey have a good level of experience in the field of constructions.

Table 2. Numbers of Executed Projects during the Last 5 Years.

No. of Executed Projects	Contractor	Consultant	Owner	Average
Less than 10	34% (17)	8% (1)	15% (3)	25% (21)
11 - 20	44% (22)	15% (2)	35% (7)	37% (31)
21 - 30	14% (7)	46% (6)	15% (3)	20% (16)
More than 30	8% (4)	31% (4)	35% (7)	18% (15)
Total	100% (50)	100% (13)	100% (20)	100% (83)

Table 3. Values of Executed Projects during the Last 5 Years (in millions US\$).

Values of Projects	Contractor	Consultant	Owner	Average
Less than 0.5	20% (10)	8% (1)	-	13% (11)
1 - 3	34% (17)	15% (2)	15% (3)	27% (22)
3 - 5	24% (12)	23% (3)	40% (8)	28% (23)
More than 5	22% (11)	54% (7)	45% (9)	32% (27)
Total	100% (50)	100% (13)	100% (20)	100% (83)

### Accidents during the Last Five Years

It is essential to recognize the rates, degrees, and the main causes of injuries among construction workers. The results of the survey highlighted the serious bad safety situation, where 75% (62) of the participants in the survey had accidents in their construction projects during the last five years (Figure 3). Accidents occurred in 72% (36) of contractors' construction sites, while 77% (10) of the responding consultants and 80% (16) of the responding owners stated that accidents occurred during working with projects that were supervised or owned by them. The results showed that 77% (23) of the first two classes of contractors had accidents, while 65% (13) of the third and the fourth classes of contractors had accidents in their construction projects during the last five years. This indicates that companies with higher construction project values have accidents more than the smallest due to the size and the complexity of the projects.

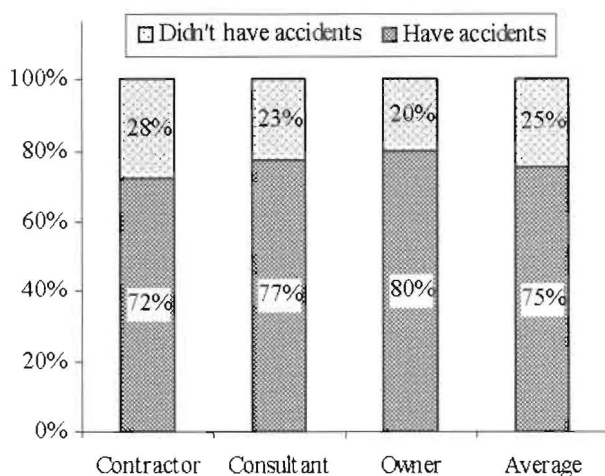


Fig. 3. Accident Rates among the Three Parties.

Figure 4 shows that 5% of contracting companies had death cases, and 14% of them had injuries that caused permanent inability. More than 40% (20) of them had temporary injuries and the majority of contractors had a very high numbers of light injuries. There were difficulties in obtaining records from the respondents to understand the rates and the causes of fatalities and injuries. These difficulties were due to the lack of records kept by contractors. However, in some cases when the records were available, there was difficulty in finding or obtaining them. In general, the main reasons of fatality cases

were falling from heights, being caught under excavations, or electrical shocks. The main reasons for other injuries were due to fall from heights, bad use of equipment, dropped objects and materials, being caught under excavations, and the exposure to toxic materials. The results in the Gaza Strip coincides with the results of Alazab (2000) in Egypt, Hinze and Gambatese (1992) in USA, Yanai, *et al.* (1999) in Israel; and Lubega, *et al.* (2000) in Uganda. They all found out that being struck by an object, falling at ground level, being hit by falling objects, and being caught under excavations were the most common causes of injuries among construction workers.

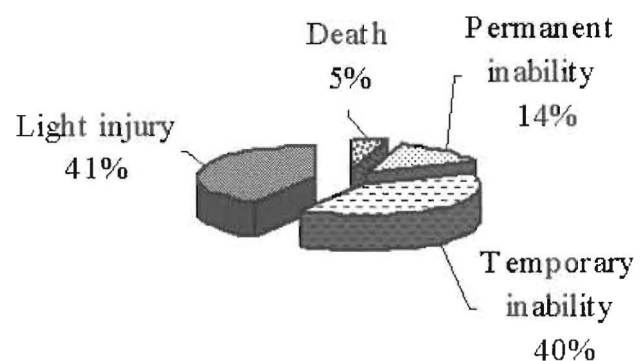


Fig. 4. Types of Injuries among Contractors.

### Recording Accidents

The study findings indicate that 49% (41) of the respondents kept records of the size, nature, cause, and results of the injury, while 51% (42) of them didn't care for this issue (Figure 5). 77% (10) of consultants concentrated on recording the size and the cause of the injury. Owners and contractors had less concern than consultants in documenting the injuries (46% (22) and 45% (9), respectively). Consultants have better injury record than contractors or owners due to their focal interest on paper works and documentation, while the other parties, mainly contractors, their concerns were commonly on the execution of the work and the profit. Moreover, most of the contractors did not recognize the significance and the role of the safety recording in improving the safety measures in constructions.

The results in this study differ from the results of Hinze and Wilson (1996) in USA, Kartam, *et al.* (2000) in Kuwait, and Poon, *et al.* (2003) in Hong Kong. They found that

the majority of respondents to their surveys in the three countries recorded and investigated construction injuries and all agreed that accident investigations were vital to improved safety performance.

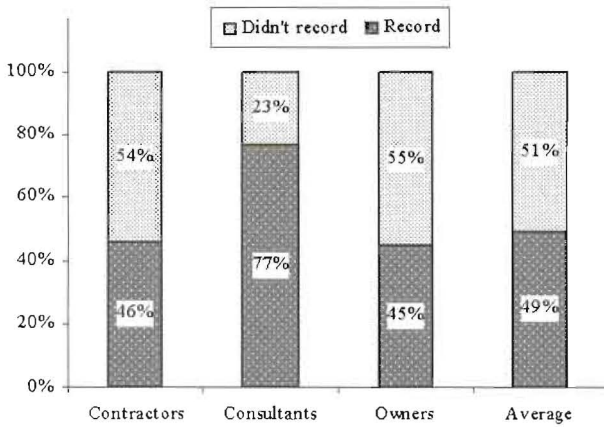


Fig. 5. Respondents Recording Accidents.

This could be attributed to the care of these countries to perform safely and to the active role of the government to follow up safety procedures in construction projects, while in the Gaza Strip, there is a general unawareness about the importance of recording the construction injuries from the government, owners, consultants, and contractors; safety investigation is considered weak in constructions in Gaza Strip. The investigation of an accident can provide meaningful information that can be used effectively to reduce or even eliminate foreseeable hazards in the sites.

**Perception of Causes of Accidents**

A high percentage of the respondents (contractors, consultants, and owners) believed that high accident rates on construction sites were due to the workers attitude of carelessness as well as lack of safety knowledge; percentages were 46% (38) and 43% (36), respectively (Figure 5). In addition, they considered that weak consultation and management in the field of safety (29% (24) and 24% (20), respectively) attributed to the high accident rates on construction sites. All these reasons, in addition to lack of safety legislation are causes that contributed to the increase of accident rates in constructions (14% (12) and 11% (9), respectively).

The results of this study in the Gaza Strip are comparable with those of Kwok (2003) study which indicated that workers attitude of carelessness as well as lack of safety knowledge are the main two contributing factors to the increase of construction accident rates in Hong Kong.

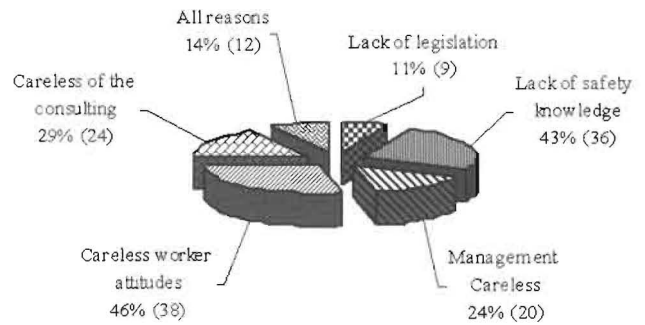


Fig. 6. Reasons of the High Accident Rates in Constructions. (The percentages in Fig. 5 do not add up to 100 because there are overlapping of the choices).

**Lack of Management in Safety Practice**

The results of this study indicated that 42% (35) of the surveyed respondents (contractors, consultants, and owners) believed that the top management of all the construction firms in the Gaza Strip contributes to increasing accident rates due to their negligence in employing safety officers, and due to their perception that the cost of safety is an additional cost that could be saved (41% (34)) (Figure 7). The respondents also believed that top management neglect safety training and safety motivations (31% (26) and 12% (10), respectively). Finally, 11% (9) of the respondents said that all the mentioned factors have a direct effect in increasing the accident rates.

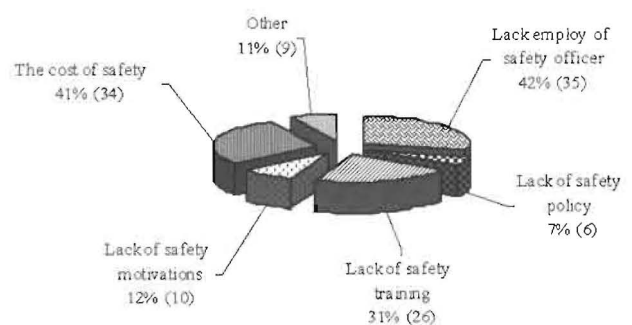


Fig. 7. Lack of Management in Safety Practice. (The percentages in Fig. 6 do not add up to 100 because there are overlapping of the choices).

The findings showed that failing in employing safety officers can be traced to the lack of management towards reducing accident rates, which is in agreement with the results of Hinze (1997). He found out that firms with better safety records were those employing full-time safety officers with considerable authority in most company projects. The results also coincide with Hinze and Wilson (1996) findings who believed that safety incentives are designed to influence workers actions so that safer worker's performance is encouraged and rewarded.

### Safety Inspection

The results showed that 63% (52) of the respondents didn't conduct special safety inspections. The rest of the respondents 37% (31) conducted these inspections during the regular visits of inspectors to the sites. These high percentages indicate the lack of inspection processes. This carelessness is attributed to the unawareness of the respondents about the significance of such safety inspections. Conducting special safety inspection increases the rate of identifying hazards. Most of the injuries are the result of unsafe physical conditions, unsafe worker actions, or a combination of the two. Such safety inspections will help in reducing greatly the rates of accidents. Results of this study are consistent with those of Gervais (2003) who indicated that successful companies are those adopting regular safety inspections to their construction sites as one of the main practices to improve construction safety.

### Safety Tools

Table 4 illustrates the average percentages of the respondents (contractors, consultants, and owners) that feel concern about using safety and emergency tools in construction sites. Using helmets was ranked first with a mean value of 2.90. First aid bags, emergency telephone numbers, and safety footwear were ranked second, third, and fourth, respectively. The use of eye protection, fire protections, and other emergency tools were of less concern than the previous safety tools. The inexpensive cost of helmets and first aid bags make these tools to be used more than others. However, there is a general carelessness in using the main safety tools in local construction sites.

In China, the result of Tam, *et al.* (2004) showed that the most common safety equipment provided are gloves, helmets and eye goggles. However, many workers in China as in the Gaza Strip consider that helmets are not convenient for their operations. The result of Sawacha, *et al.* (1999) study confirmed the significance of operators wearing protective clothing and equipment construction on site to reduce injuries. It is suggested that operators who refuse to wear the protective and safety tools should be punished somehow by management, and construction companies should provide these tools and monitor their effective usage.

### Safety Policy

The majority of the respondents in the survey didn't have a written policy, but they assumed that safety and avoiding injuries are an ethical responsibility and should be implemented.

**Table 4.** Using Safety Tools in Construction Sites.

Safety tools	Always used	Some times	Rarely used	Not used	Mean	Ranking
First aid bag	24% (20)	51% (42)	12% (10)	13% (11)	2.85	2
Emergency telephone numbers	37% (31)	25% (21)	19% (16)	18% (15)	2.82	3
Eye protection	18% (15)	31% (26)	28% (23)	23% (19)	2.44	5
helmets	30% (25)	39% (32)	23% (19)	8% (7)	2.90	1
Safety footwear	20% (17)	30% (25)	28% (23)	22% (18)	2.50	4
Fire protection	18% (15)	29% (24)	20% (17)	33% (27)	2.32	6
Emergency tools	7% (6)	28% (23)	31% (26)	34% (28)	2.08	7

This reflects the respondents' unawareness about the significance of the benefits of the written safety policy towards improving the construction safety. Respondents believed that there is a need to establish safety policy for each construction firm and to review it annually. The review should include improving the execution procedures, role of safety personnel, corrective measures, reviewing the last accidents and putting protective measures for the future works.

### **Safety Meetings**

The study results showed that 83% (67) of the respondent were not conducting regular safety meetings. The other respondents 17% (16) conducted safety meetings only after the occurrence of a serious accident in their sites. This indicates that contractors do not consider safety as a priority. Safety meetings topics could include safety rules, hazards, corrective actions, accident prevention, and reviews of accidents and near accidents. Such meetings should be held at least once a month and for all levels of supervision. Tam, *et al.* (2004) believed that regular safety meetings are necessary for communicating safety information to all parties. About 36% of the respondents claimed that they had regular safety meetings, and the others indicated that safety issues were discussed and presented at other meetings, such as construction planning meetings. However, 87% of the respondents in Tam, *et al.* (2004) survey in China argued that the top management seldom attended the safety meetings. This situation is similar to the Gaza Strip. Mohamed (2002) argues that management should encourage and support safety by setting a good safety example, managing health and safety programs effectively, attending health and safety meetings, performing inspections, investigating near-miss accidents, and reviewing safety performance at all levels.

### **CONCLUSION AND RECOMMENDATIONS**

The Gaza Strip construction industry has many special features that adversely affect the safety of its workers. These feature and problems arise due to many reasons: the competitive tendering between the contractors forcing them

to reduce their profits and costs to stay in the market, so most contractors do not consider safety costs in their tenders. Furthermore the main concern of a contractor is how to save money and reduce costs. In general, safety has low priority in the company's plans, and it is, unfortunately, considered a waste of money, and safety is not considered during the contract awarding process. Moreover, safety provisions in most of the construction contracts in the Gaza Strip are not enforceable.

The results of this study has shown the serious and bad safety situation in the Gaza strip, where most of the participants in the survey had accidents in their construction projects during the last five years. Accident rates among the first and the second classes of the contractors are higher than the rates among the third and the fourth classes This is attributed to the fact that the first two classes of contractors execute projects with sizes and values more than the projects which are executed by the other two. The main causes of fatalities and injuries are falling from heights, dropped objects and materials, and being caught under excavations.

Attitude of carelessness and lack of safety knowledge and training are the main reasons contributing to the increasing rate of accidents among construction workers in the Gaza Strip. Besides the lack of safety regulations in the Gaza Strip, management at all levels were short in: employing safety officers, arranging safety training programs, applying safety policies, and using safety motivation as a tool to improve the safety performance in constructions. The Lack of written safety policies, development of safety plans, safety inspections, safety meetings, and safety records are all problems leading to bad safety conditions in the Gaza Strip. Information gathered from recording accidents are useful in formulating corrective actions and reduce future accidents. Carrying out a detailed work plan gives the opportunity to deliver all materials and equipment necessary to perform each task safely. The plan also identifies all the dangerous tasks which would help to take all the safety procedures into consideration during performing these tasks.

Contractors should prepare safety training



programs to help their personnel to carry out various preventive activities effectively. Training material should discuss the costs of accidents, the influence of good safety performance, and should stress the safety objectives of the company. It should also discuss the relevant laws and legislation, and contractual relationships with clients on safety matters. Contractors should utilize a self-inspection program, assign the costs of accident prevention programs to the company safety account. Safety should be considered in the same manner as cost and schedule. They should provide incentives and highlight caution, and conduct regular safety meetings to discuss safety issues in their construction sites.

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### REFERENCES

- Alazab, R** (2004) Work-Related Diseases and Occupational Injuries among Workers in the Construction Industry in Egypt. *Afr. Newslett on Occupational Health and Safety* **14**(1): 37-42.
- Cameron, I, Duff, A, and Hare, B** (2000) *Integration of Health and Safety Planning in Construction Project Management through the Development of Best Practice "Gateway" Model*. Caledonian University, Glasgow, UK.
- Enshassi, A** (2003) Factors Affecting Safety on Construction Projects. Islamic University of Gaza, Gaza Strip, Palestine.
- Gervais, M** (2003) Good Management Practice as a means of Preventing Back Disorders in the Construction Sector. *Safety Science* **41**(1): 77-88.
- Hall, A** (2003) *Management of Industrial Safety*. Delft University of Technology, Netherlands.
- Hinze, J** (1997) *Construction Safety*. Prentice Hall, UK.
- Hinze, J, and Gambatese, J** (1992) Design Decisions that Impact Construction Worker Safety. Available at: [www.clibworld.nl/pages/bp/papers/w99p1.pdf](http://www.clibworld.nl/pages/bp/papers/w99p1.pdf)
- Hinze, J, Pederson, C, and Fredley, J** 1998, Identifying root causes of construction Injuries. *Journal of Construction Engineering and Management, ASCE*, **117** (3): 537 -550.
- Hinze, J, and Wilson, G** (1996) Zero Injury Techniques Validation. Available at: [www.nccer.org/PDF/C11Study.pdf](http://www.nccer.org/PDF/C11Study.pdf)
- Jannadi, M, Assaf, S** (1998) Safety Assessment in the Built Environment of Saudi Arabia. *Safety Science* **29**(1): 15-24.
- Kartam, N, Flood, I, and Koushki, P** (2000) Construction Safety in Kuwait: Issues, Procedures, Problems, and Recommendations. *Safety Science* **36**(3): 163-184.
- Kisner, S, and Fosbroke, D** (1994) Injury Hazards in the Construction Industry. *J. Occup.*, **36**(2): 137-143.
- Kowk, W** (2003) *An Evaluation of Acceptance on Construction (Design and Management) Regulations in Hong Kong*. International Conference on Construction Training, Hong Kong, China.
- Levitt, RE, and Samelson, NM** (1993) *Construction Safety Management*. John Wiley, London, UK.
- Lubega, H, and Kiggundu, B** (2000) *An Investigation into the Causes of Accidents in the Construction Industry in Uganda*. Department of Housing, Ministry of Works, Kampala, Uganda.
- Mearns, K, Whitaker, S, and Flin, R** (2003) Safety Climate, Safety Management Practice and Safety Performance in Offshore Environments. *Safety Science* **41**(8): 641-680.
- Ministry of Labor** (2003) *Statistical Study for Fatalities and Injuries in Gaza Strip for the Period from 1998 to 2003*. Ministry of Labor, Gaza Strip, Palestine.
- Mohamed, S** (2002) Safety climate in construction site environments *Journal of Construction Engineering and Management, ASCE*, **128**(5): 375-384
- OSHA** (1999) *The State of Occupational Safety and Health in the European Union*. European Agency for Safety and Health of Work, London, UK.
- Poon, W, Ma, G, and Ho, J** (2003) *Statistical Analysis on Factors in Reducing Construction Site Accident Frequency Rate in Hong Kong*.

Hong Kong, China.

**Sawacha, E, Naoum, S, and Fong, D** (1999)

Factors Affecting Safety Performance on Construction Sites. *International Journal of Project Management* 17(5): 309-315.

**Tam, C, Zeng, S, and Deng, Z** (2004) Identifying

Elements of Poor Construction Safety Management in China. *Safety Science* 42(7): 569-586.

**Williamson, A, Feyer, A, Cairns, D, and**

**Biancotti, D** (1997) The Development of A measure of Safety Climate: The Role of Safety Perceptions and Attitudes. *Safety Science* 25( 1- 3): 15-27.

**Yanai, O, Goldin, L, Kugel, C, and Hiss, J**

(1999) Occupational Fatalities in Israel. *Journal of Jirical Forensic Medicine* 6(3): 129-132.

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