

ANALYSIS OF CONSTRUCTION SITE INJURIES IN PALESTINE

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KEYWORDS

Construction, site injuries, safety, codes, Palestine

Introduction

Construction fields are considered dangerous places. A large number of people die on them every year. Many site injuries result from people falling from structures like roofs and scaffolds, or being hit by falling objects. Many others are caused by the misuse of mechanical plant and site transport, including hoists (Frayer, 1995). There is nearly always keen competition for new contracts and site personnel are often under pressure to work to tight time and cost constraints. It is hardly surprising that safety is often neglected.

In spite of the low attention often given to construction sites injuries in many countries, the statistics continue to be alarming. For instance, fatal accidental injury rates in the United Kingdom and Japan are reported to be four times higher in the construction industry, when compared to the manufacturing industry (Bentil, 1990). Construction is often classified as a high-risk industry because it has historically been plagued with much higher and unacceptable injury rates when compared to other industries. In the United States, the incidence rate of accidents in the construction industry is reported to be twice that of the industrial average. According to the National Safety Council, there are an estimated 2,200 deaths and 220,000 disabling injuries each year (National, 1987).

Over the years, construction has been a major contributor to the national economy. Presently, however, its share of the GNP is about 5-7 percent. In the 1970's this percentage was roughly 7 - 10 percent (Koehn, 1996). In Palestine, construction share of the GDP in 1994 is about 16.8, in 1992 the percentage was about 13.0 (Table 1). Therefore, it is crucial to take safety factor into consideration in the construction industry in Palestine in order to minimize the number of injuries on construction fields. This paper presents an analysis of statistical data on construction site injury between 1999 to 2000 published by the Ministry of Labor.

Safety Management

The attitudes and behavior of construction workers and managers towards safety is undoubtedly a major factor in the poor accident record of the industry in Palestine. Many workers and managers see construction as a rough job for tough, self-reliant people. It is widely believed that building to tight deadlines at low cost is incompatible with high safety standards (Adb. Ghani, 1996).

Construction workers accept that their work is demanding and risky, although they usually underestimate the risk. Group norms may cause individuals to ignore safety measures for fear of appearing cowardly to their workmates (Laney, 1982). Many managers and workers resent outside pressures on them to comply with safety regulations and sometimes make collusive arrangements to avoid them. Unfortunately, in Palestine safety regulations do not exist till now (Enshassi, 1998).

If construction site is to become safer, the major task is to change people's attitudes. This may mean changing contractors and clients' attitudes too. They may have to accept that there is a safety premium to pay on the cost of construction; that if getting a rock-bottom price means that people will be killed or seriously injured, then the price is too low.

The management of labor safety and health at a construction site is the responsibility of the employer. The implementation of a specific safety plan is the responsibility of various sections and departments of a

company. Depending upon the scope and nature of the organization, the employer should direct the labor safety and health management committee to perform the following duties (Labor safety, 1991):

- Prepare a thorough occupational accident prevention plan and direct implementation on sites.
- Plan and monitor labor safety and health management in all divisions.
- Plan and check regularly the labor safety and health installations.
- Direct and supervise safety personnel in conduction inspection tours, periodic inspections, and priority inspections of the work environment.
- Plan and conduct labor safety and health education and training.
- Respond to and supervise occupational accident investigations and compile occupational accident statistics.
- Provide the employer with data and suggestions related to labor safety and health management.

Industry Category	Year 1992	Year 1993	Year 1994
Construction	13.0	16.4	16.8
Agriculture	35.5	29.0	33.3
Industry	7.4	8.4	8.2
Government	10.5	11.8	11.2
Other GDP	33.6	34.4	30.5
Employment in West Bank and Gaza	204.0	232.0	249.0
Employment in Israel	116.0	83.0	68.0

Source: IMP and PRC DAR

Table 1 Economic Structure Percentage of GDP

Year	Total Industrial Injury (A)	Construction Injury (B)	(B/A) X 100% (%)
1994	22	1	4.5%
1995	32	1	3.1%
1996	23	1	4.3%
1997	48	6	12.5%
1998	35	9	25.7%
1999	75	31	41.3%
2000	247	89	36%
Average Percentage Construction in Injury from the Total Industrial Injury			18.2%

Source: Ministry of Labour, PNA, Annual Reports

Table 2 Construction Injury As Compared To Total Industrial Injury

The construction industry should be interested in safety regulations and implementation for humanitarian and economic reasons. In humanitarian terms, if accidents occur, a construction firm and/or its employees may suffer pain and/or loss of life due to an accident. In addition, its safety record will be lower and there may be a loss of the firm's reputation. In economic terms, an effective safety management program may be profitable for a construction firm. This is because accidents have high direct (medical, worker's compensation) and indirect (reduction of productivity, job schedule delays, rework) costs.

Analysis of the Construction Site Injuries

The analysis was based on the statistical data published by the Ministry of Labor in Palestine between 1994 and 2000. Table (2) shows that from 1994 to 2000 the total industrial injuries increased from (22) cases to (247) cases. In addition, the number of reported construction site injuries increased from (1) case to (89) cases. The site injuries account for an average of (18.2%) of the annual total industrial injuries. However, it has been found that the majority of contractors in Palestine did not report site injuries to the Ministry of Labor (Enshassi, 1997). Two main reasons were found behind that. Firstly, the employees have no insurance, and, secondly, the employers are concerned to loose their reputation if they report the

site injuries. Therefore, it is uncertain whether the number of injuries which was published by the Ministry of Labor was correct or not.

It can be seen from table (3) that construction site injuries (28.6%) are the highest among other major industrial injuries. It can be observed from tables (2) and (3) that construction site injuries have dramatically increased in 1999 (41.3%) and in 2000 (36%) compared to 1994 (4.5%). This can be traced to the increase of building and construction activities aiming at the reconstruction of newly developing Palestine after the peace accord. The International and Arab communities have contributed to the Palestinian National Authority in 1994 US\$511,738M and in 1995 US\$429,995M and in 1996 US\$516,276M in order to reconstruct Palestine (PECDAR, 1997).

Due to the urgent need for improving the infrastructure in Palestine, an emergency program was established to reconstruct and build as much as possible in a short duration. This situation puts a lot of pressure on clients and contractors as well, in order to complete a number of projects (e.g. housing, schools, roads, water and sewage) in a short time. There is still an absence of safety codes and regulations in Palestine. This has led to an increase in construction site injuries. It should be noticed that the figures presented in tables (2) and (3) which were published by the Ministry of Labor might not be realistic.

According to a survey conducted by the author (Enshassi, 1997), the number of construction site injuries is far more than what was published by the Ministry of Labor. It has been observed that when an accident happens on a construction site, the employer does not report to the concerned department. He tries to solve the problem internally according to the culture and attitudes of people involved. This unhealthy system has contributed negatively to the safety requirements on the site. In addition, no body can learn what the cause of the accident is and how it can be avoided in the future. Moreover, no reliable statistical data is available regarding the real number of injuries on construction projects.

Year	All Industries	Manufacturing & Processing	Wood Workshops	Tiles & Blocks Factories	Services	Construction	Plastic Factories	Electricity	Sanitary Services	Others
1994	22	7	2	3	1	1	1	--	--	7
1995	32	11	6	2	1	1	1	--	--	10
1996	23	10	1	1	1	1	--	--	--	9
1997	48	6	8	5	7	6	1	3	8	4
1998	35	6	5	6	--	9	--	2	2	5
1999	75	8	6	12	1	31	2	5	4	6
2000	247	32	15	19	12	89	15	16	15	34
Total	482	80	43	48	23	138	20	26	29	75
%	100	16.6	8.9	10	4.8	28.6	4.1	5.4	6	15.6

Source: Ministry of Labour, PNA, Annual Reports

Table 3 Total Major Industrial Injury According to Type & Industry

Most construction site injuries in Palestine were subjected to the production-related workers and equipment operators. The type of accidents mainly are the result of construction workers, include being struck by falling objects and stepping on, striking against or being struck by objects. The statistics show that the reasons for accidents were falling (18%), equipment and plant (7%), material dropped from a height (9%), misuse of manual equipment (3%), steel works (6%), nails (49%) and other miscellaneous (8%). The nature of the injuries mainly consists of fractures, wounds, cuts, sprains and pains, confusions, crushings and superficial injuries. Most frequent site injuries occur as a result of poor usage of safety belts, safety helmets and boots, and over exertion of construction workers on site.

Degree of Injury

Construction site injuries consist of minor injury, disablement and fatality. Table (4) shows the degree of total industrial injuries. In 1994, it has been found that (7) cases were minor injuries, (13) cases were disablement and (2) cases were fatality. In 2000, it can be seen that (42) cases were minor injuries, (198)

cases were disablement and (7) cases were fatality. This indicates that safety regulations and measures were not considered by employees.

Table (5) shows the percentage of construction injuries over the total industrial injuries. In 1994, one minor injury case was found, and no single disablement or fatality was found. In 2000, (51) minor injury cases were found, (34) disablement cases were observed and (4) fatal cases were found. This indicates that the rate of injury has increased for all degree of injuries. It means that safety procedures were not a priority for most employees in Palestine.

By comparing the degree of construction injuries to the total industrial injuries (see tables 4, 5) the percentage of minor injury, disablement and fatality of the construction over all the industries was gradually increasing from 1994 to 2000. The percentage of minor injuries increased from (4.5%) to (20.7%) and disablement rose from (0%) to (13.7%), and it also similarly occurred to the fatality which rose from (0%) to (1.6%) of the total industrial fatality. Unfortunately, the Ministry of Labor has no data regarding the financial implication of construction injuries. However, insurance, claims, delay in construction works and compensation paid to the affected workers or families have financial implications as a result of construction site injuries.

Year	Total Industrial Injury	Minor Injury		Disablement		Fatality	
		No.	%	No.	%	No.	%
1994	22	7	32%	13	59%	2	9%
1995	32	15	46%	16	50%	1	4%
1996	23	13	57%	10	43%	--	--
1997	48	23	48%	23	48%	1	4%
1998	35	20	57.2%	14	40%	1	2.8%
1999	75	37	49%	35	47%	3	4%
2000	247	42	17.2%	198	80%	7	2.8%

Source: Ministry of Labour, PNA, Annual Reports

Table 4 Degree of Total Industrial Injury

Year	Total Industrial Injury	Construction Injury	Minor Injury		Disablement		Fatality	
			No.	%	No.	%	No.	%
1994	22	1	1	4.5%	--	--	--	--
1995	32	1	1	3.1%	--	--	--	--
1996	23	1	--	--	1	4.3%	--	--
1997	48	6	3	6.25%	3	6.25%	--	--
1998	35	9	3	8.6%	5	14.3%	1	2.8%
1999	75	31	16	21%	13	17.3%	2	3%
2000	247	89	51	20.7%	34	13.7%	4	1.6%

Source: Ministry of Labour, PNA, Annual Reports

Table 5 Percentage of Construction Injury Over the Total Industrial Injury (According to The Degree of Injury)

Conclusions

The analysis of the data presented in this paper brings about the following findings:

- Construction site injuries account for an average of (18.2%) of the annual total industrial injuries, this is considered relatively high.
- The number of construction site injuries (28.6%) is the highest among other major industrial injuries. This is quite an alarming result.
- The majority of contractors in Palestine did not report construction site injuries to the Ministry of Labor. Contractors try to solve the workers injury problems internally according to the local culture.

- Safety codes and regulations still do not exist in Palestine. Therefore, there is an urgent need to establish and implement safety codes in Palestine.
- Most frequent construction site injuries occur as a result of poor usage of safety belts, safety helmets and boots and over exertion of construction workers on site.
- The common types of injury were fractures, wounds and cuts and sprains and strains.

The above mentioned findings are quite alarming to those concerned about site safety in Palestine. It is more so if we consider, the unreported injuries. It is important to eliminate the cause of accidents in order to minimize the number of injuries. Construction site safety precautions should be promoted in all construction sites.

Recommendations

The job safety plan must be based on analysis of project risks and a preventive program specifically modeled to combat the particular and peculiar hazards of that project. In addition, construction workers often tend to be unmindful of safety regulations. It is recommended that construction workers should be constantly reminded of the safety problems present through their supervisors. Clear instruction is required concerning how specific tasks should be carried out so as to minimize the chances of accidents and injuries. The success of a safety program is contingent upon the advance recognition of the hazards present and personal safety instruction to the tradesmen before hazardous work is initiated.

In Palestine, it is the responsibility of contractor to provide a safe and healthy work environment. This must be accomplished in conformity with established standards that are designed to prevent the risk of injury caused by tools, machinery, equipment, etc. It is recommended that safety codes and regulations should be created and updated frequently. The purpose of these codes is to prevent injuries, fatalities, and structural failures. They also indirectly reduce the expenses and assist in maintaining the reputation of construction firms.

The Ministry of Labor should put more emphasis on safety requirements and implementation. The Ministry must set up a safety committee, the main functions of this committee are:

- To monitor working arrangements on site with regard to health and safety.
- To develop site safety rules, safe systems of working and guidelines for hazardous operations.
- To study accident trends and safety reports.
- To investigate the causes of serious accidents.

Effective implementation programs should focus on both the physical and the behavioral sides of safety and health. An adequate safety program can assist minimizing construction site injuries which in return can reduce financial loss, increase productivity, enhance the potential profit, and above all save lives of work teams to help the industry and nation as a whole.

There is a pressing need to make students of civil engineering, architecture in Palestine more aware of the importance of health and safety. This can be accomplished by incorporating some courses on construction safety in the core curricula of such programs. In addition, there is a need to conduct training programs on a regular basis for construction engineers and workers about safety rules and regulations. Construction site safety should be seriously considered as one of the keys to successful construction industry.

Acknowledgement

The authors would like to express their appreciation to George Forster Fellowship Programme of Alexander von Humboldt Foundation in Germany for funding this research.

References

- Abd. Ghani, K., Construction Site Injuries: The Case of Malaysia, Proceedings of the First International Conference of CIB Working Commission W99 - Lisbon - Portugal, 1996.
- Bentil, K., The Impact of Construction Related Accidents on the Cost and Productivity of Building Construction Projects, Proceedings of the CIB 90, Vol. 6, Management of the Building Firm, Sydney, 1990.
- Enshassi, A., Construction safety : issues in Gaza Strip, paper published in the International Journal of Building Research and Information, Vol. 25, No. 6, 1998.
- Enshassi, A., Construction Site Injuries in Palestine: Causes and Effects, unpublished paper, 1997.
- Frayar, B., The Practice of Construction Management, London, Collins, 1995.
- Koehn, E. and Pan, C, S, Comparison of Construction Safety and Risk Between USA and Taiwan, Proceedings of CIB - W65, The Organization and Management of Construction, UK, 1996.
- Laney, J. C., Site Safety, London and New York: Construction Press, 1982.
- Labor Safety and Health Act, Council of Labor Affairs, Executive Yuan, Taiwan, Republic of China, 1991.
- National Safety Council, OSHA Investigates Connecticut Apartment Project Collapse. OSHA Up to Date, Vol., XVI, No. 5, Chicago, Illinois.
- PECDAR, Monthly Information Bulletin, Jerusalem, Vol. 1, No. 7, 1997.