

Construction Safety in Kuwait

H. M. Al-Humaidi¹ and F. Hadipriono Tan²

Abstract: In gulf region countries like Kuwait, the construction process can become very challenging. In this paper, we analyze construction-related accidents in Kuwait including type of accident, type of injury, body part injured, and accident outcome for the years 1996–2007. We present examples of recent cases and evaluate these cases presenting current Kuwaiti rules and legislation and providing suggestions for ensuring a safer construction environment. As this research shows, the construction industry is the most hazardous industry in Kuwait. On average, falls are the major type of accident (33.2%) followed by being crushed or struck by a falling object (25.2%). Use or misuse of tools caused the third largest number of accidents in Kuwait (18.1%). The most frequent type of injury is fractures (52.6%) and the most common injured body part is the upper body (53.4%). An average of (82.7%) of victims of construction accidents in Kuwait sustain permanent disabilities. It is clear that the Kuwaiti construction industry has a safety problem and that there is a pressing need to change current practices and legislation in construction and building sites.

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Introduction

In construction, successful results depend on three resources, labor, materials, and equipment. Loss of any resource can lead to project failure. Workplace accidents have become a major concern because human loss can never be recovered. Accident victims face enormous personal difficulties, and require large amounts of resources to deal with the consequences of an accident. In general, there are three challenges to the maintenance of safe environments on construction sites. First, safety is difficult to measure, as obtaining a safe site depends on subjective judgment dependent on one's personal definition of safety. In general, no process can be termed "safe" in an absolute sense. Resources devoted to maintaining a safe environment are measurable, but after devoting these resources the question arises: Is the safety process safe? Second, human error is not controllable, and individuals can only be blamed for negligence and controllable circumstances within their responsibilities. Construction projects are very complex and fragmented by nature, since many parties work together to achieve desired outcomes; therefore matching responsibilities with control is extremely difficult. Third, projects are unique and temporary by nature; therefore adopting a standardized process that can be enhanced according to lessons learned from prior projects can result in failure to predict new sources of hazards, depending on the nature of the project. Given these difficulties, there is a pressing need for safety management tools to maintain safe work environment.

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In order to study the construction safety performance in Kuwait, data were obtained from the Ministry of Social Affairs and Labor (MSAL). Case studies of construction accidents in Kuwait were also collected from local newspapers.

Construction Labor Force in Kuwait

Information obtained from MSAL reveals a consistent growth of the labor force. Construction workers make up approximately 9.9% of the total labor force for the years 2001 to 2007. Fig. 1 shows the trend for the number of total labor force in Kuwait and the number of construction labor force in Kuwait. Despite the relatively low number of labor force compared to that of the entire industry, the percentage of accidents in the construction industry is far higher than all other industries combined (Hinze 2000). Most of the construction labor force is comprised of for-

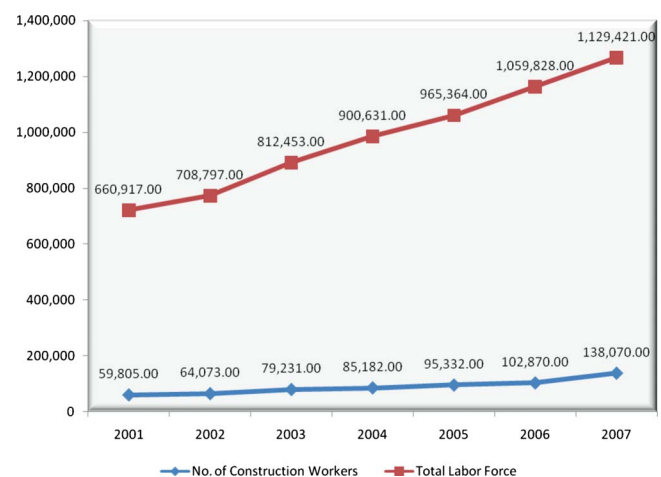


Fig. 1. Number of total labor force and construction labor force in Kuwait

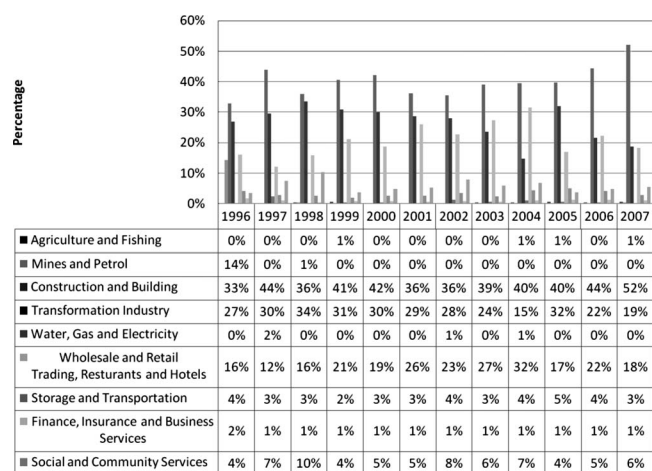


Fig. 2. Percentages of accidents according to industry (1996 to 2007)

eign nationals from Asia, and these workers accept low-paying construction jobs because of the poverty they endure in their home countries. Most construction workers in Kuwait have very limited education; some workers barely read and write. Often, these workers lack the training necessary to perform complicated construction tasks. Because the majority of the construction labor force comes from countries in South Asia, these workers do not speak the local language. Experience shows that these conditions can become a breeding ground for accidents (Hinze 2000).

Construction Accidents in Kuwait

According to MSAL statistics, the construction industry has been responsible for the majority of worker injuries between 1996 and 2007. Fig. 2 shows the percentages of workplace accidents reported by various industries for the years 1996 through 2007 (Kuwait Ministry of Social Affairs and Labor 1997a, 1997b, 1999,

Table 1. Construction-Related Accidents for the Years 1996, 1997, and 1998–2001

	Construction-related accidents in Kuwait (1996–1997 and 1999–2001)									
	1996		1997		1999		2000		2001	
	Number	%	Number	%	Number	%	Number	%	Number	%
Type of accident										
Falls	297	21.4	378	28.8	391	31.5	332	34.2	244	34.5
Crushed or struck by object	365	26.4	290	22.1	343	27.7	255	26.3	179	25.3
Overexertion	60	4.3	103	7.9	37	3.0	41	4.2	22	3.1
Use or misuse of tools	246	17.8	281	21.4	253	20.4	168	17.3	134	18.9
Debris-caused	104	7.5	107	8.2	50	4.0	23	2.4	20	2.8
Electric shock	9	0.6	9	0.7	8	0.6	17	1.8	9	1.3
Fire/explosion	11	0.8	13	1.0	16	1.3	13	1.3	6	0.8
Heavy equipment	57	4.1	63	4.8	38	3.1	46	4.7	40	5.6
Chemicals/poisoning	15	1.1	2	0.2	2	0.2	1	0.1	1	0.1
Asphyxiation	0	0.0	0	0.0	19	1.5	24	2.5	9	1.3
Automobile	0	0.0	0	0.0	42	3.4	30	3.1	14	2.0
Other	221	16.0	65	5.0	41	3.3	20	2.1	30	4.2
Total	1,385		1,311		1,240		970		708	
Type of injury										
Amputation	59	4.3	54	4.1	67	5.4	49	5.1	28	4.0
Wounds	302	21.8	344	26.2	231	18.6	164	16.9	96	13.6
Fractures	612	44.2	591	45.1	615	49.6	547	56.4	435	61.4
Bruises	161	11.6	168	12.8	200	16.1	125	12.9	90	12.7
Burns	42	3.0	15	1.1	22	1.8	20	2.1	17	2.4
Other	209	15.1	139	10.6	105	8.5	65	6.7	42	5.9
Total	1,385		1,311		1,240		970		708	
Injured body part										
Head	58	4.2	48	3.7	54	4.4	25	2.6	25	3.5
Eye	43	3.1	99	7.6	50	4.0	26	2.7	15	2.1
Upper body	809	58.4	646	49.3	639	51.5	575	59.3	395	55.8
Lower body	423	30.5	401	30.6	396	31.9	267	27.5	222	31.4
Torso	33	2.4	63	4.8	50	4.0	37	3.8	21	3.0
Miscellaneous	19	1.4	54	4.1	51	4.1	40	4.1	30	4.2
Total	1,385		1,311		1,240		970		708	
Outcome										
Full recovery	372	26.9	419	32.0	268	21.6	197	20.3	141	19.9
Permanent disability	1,005	72.6	882	67.3	967	78.0	767	79.1	559	79.0
Death	8	0.6	10	0.8	5	0.4	6	0.6	8	1.1
Total	1,385		1,311		1,240		970		708	

Table 2. Construction Related Accidents for the Years 2002–2007

	Construction-related accidents in Kuwait												Totals	
	2002		2003		2004		2005		2006		2007			
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Type of accident														
Falls	340	33.4	363	29.0	277	31.8	331	29.0	512	40.9	817	46.16	4,282	33.2
Crushed or struck by object	251	24.6	380	30.4	242	27.8	135	11.8	329	26.3	483	27.3	3,252	25.2
Overexertion	16	1.6	21	1.7	53	6.1	289	25.3	11	0.9	27	1.5	680	5.3
Use or misuse of tools	227	22.3	242	19.3	205	23.5	194	17.0	193	15.4	193	10.9	2,336	18.1
Debris-caused	20	2.0	33	2.6	7	0.8	14	1.2	20	1.6	18	1.0	416	3.2
Electric shock	7	0.7	2	0.2	2	0.2	6	0.5	1	0.1	1	0.1	71	0.6
Fire/explosion	25	2.5	16	1.3	6	0.7	7	0.6	18	1.4	17	1.04	148	1.2
Heavy equipment	40	3.9	38	3.0	17	2.0	73	6.4	15	1.2	8	0.5	435	3.4
Chemicals/poisoning	3	0.3	1	0.1	0	0.0	1	0.1	1	0.1	1	0.1	28	0.2
Asphyxiation	19	1.9	27	2.2	10	1.1	9	0.8	24	1.9	30	1.7	171	1.3
Automobile	41	4.0	56	4.5	26	3.0	50	4.4	59	4.7	52	3.0	370	2.9
Other	30	2.9	72	5.8	26	3.0	32	2.8	69	5.5	123	7.0	729	5.6
Total	1,019		1,251		871		1,141		1,252		1,770		12,918	
Type of injury														
Amputation	50	4.9	71	5.7	39	4.5	58	5.1	44	3.5	92	5.2	611	4.7
Wounds	142	13.9	213	17.0	147	16.9	211	18.5	174	13.9	239	13.5	2,263	17.5
Fractures	620	60.8	643	51.4	487	55.9	626	54.9	652	52.1	965	54.5	6,793	52.6
Bruises	104	10.2	184	14.7	127	14.6	157	13.8	230	18.4	331	18.7	1,877	14.5
Burns	23	2.3	20	1.6	8	0.9	10	0.9	22	1.8	27	1.5	226	1.8
Other	80	7.9	120	9.6	63	7.2	79	6.9	130	10.4	116	6.6	1,148	8.9
Total	1,019		1,251		871		1,141		1,252		1,770		12,918	
Injured body part														
Head	22	2.2	38	3.0	25	2.9	24	2.1	39	3.1	20	1.1	378	2.9
Eye	23	2.3	30	2.4	12	1.4	14	1.2	17	1.4	29	1.6	358	2.8
Upper body	592	58.1	661	52.8	476	54.6	512	44.9	633	50.6	958	54.1	6,896	53.4
Lower body	284	27.9	374	29.9	289	33.2	497	43.6	454	36.3	642	36.3	4,249	32.9
Torso	48	4.7	53	4.2	32	3.7	34	3.0	41	3.3	58	3.3	470	3.6
Miscellaneous	50	4.9	95	7.6	37	4.2	60	5.3	68	5.4	63	3.6	567	4.4
Total	1,019		1,251		871		1,141		1,252		1,770		12,918	
Outcome														
Full recovery	112	11.0	173	13.8	103	11.8	34	3.0	156	12.5	151	8.5	2,126	16.5
Permanent Disability	899	88.2	1,064	85.1	767	88.1	1,091	95.6	1,072	85.6	1,614	91.2	10,687	82.7
Death	8	0.8	14	1.1	1	0.1	16	1.4	24	1.9	5	0.3	105	0.8
Total	1,019		1,251		871		1,141		1,252		1,770		12,918	

2000, 2001, 2002, 2003, 2004, 2005, 2006, 2007).

MSAL provided data for construction accidents for the years 1996–2007. MSAL did not report data from 1998 for unknown reasons. Tables 1 and 2 shows construction-related accidents classified by type of accident, type of injury, injured body part, and outcome for the years from 1996–1997, and 1999–2007. On the average, falls are the most frequently occurring accident (33.2%), followed by being crushed or struck by an object (25.2%). Accidents caused by the use or misuse of tools are the third most frequent accidents (18.1%). Fractures are the most common injury for construction workers (52.6%), followed by wounds (17.5%), and bruises (14.5%). Most construction injuries affect the upper part of the body (53.4%), followed by lower part of the body (32.8%). Miscellaneous accidents involving injury to more than one organ comprised 4.4% of reported accidents. On aver-

age, 82.7% of nonfatal construction accidents in Kuwait result in permanent disabilities; 16.5% of construction accident victims make a full recovery and 0.8% of Kuwaiti construction accidents result in fatalities. After examining data for construction-related accidents of the last 10 years, it is obvious that construction sites in Kuwait lack safety standards, and that there is a pressing need to change current construction practices with respect to safety. The data shows a need for improvement of safety on Kuwaiti construction sites for humanitarian reasons.

Recent Cases of Construction Accidents in Kuwait

Because there are numerous modes of construction in Kuwait, it is impractical to elaborate on each of them. The following cases

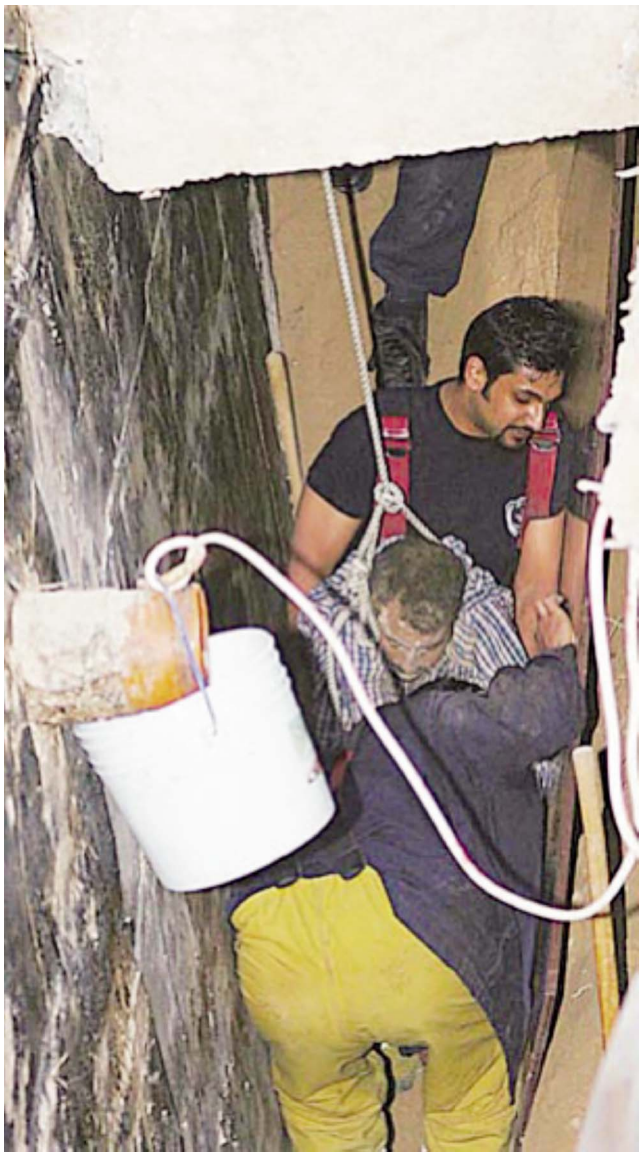


Fig. 3. Excavation collapse that killed one worker and caused serious injuries to another (Photograph courtesy of Al-Qabas)

are representative of common Kuwaiti construction accidents. They are (1) a trench collapse; (2) a crane overturn; and (3) a demolition accident.

On November 29, 2007, two construction workers, repairing residential drain pipes were digging a trench 11-ft deep and 3-ft wide in sandy soil (Al-Sharhan 2007). The unsupported sides of the excavation were collapsed, burying one worker and seriously injuring another. The 33-year-old worker who was buried died on site and the injured worker (41 years old) was rushed to the hospital. He suffered a nervous breakdown from witnessing his co-worker's death. Rescuers entered the unsafe trench to rescue the surviving worker and spent 2 h pulling him out (Fig. 3). Note also the unacceptable practice in rescuing a worker using a rope.

The workers made the excavation in Type C loose sand. Because the depth of the trench was greater than 5 ft, it required an adequate protective system. The sides of the excavation should have been sloped, benched, or supported using shoring or a trench box to prevent a cave-in. Had a competent person inspected the excavation, the cave-in accident could have been prevented. Unlike the two untrained construction workers who could not recog-

nize trenching hazards, a competent person is capable of identifying hazards and authorized to stop trenching operations immediately. The U.S. Occupational Safety and Health Administration (OSHA) standards require a stairway, ladder, or ramp to be present within 25 ft of the workers in excavations of 4 ft or deeper. In addition, the ladder should extend 3 ft above the top of the excavation (Occupational Safety & Health Administration 2008). In this case, no method of access or egress was present. The rescuers should not have entered the unsafe trench, risking their own lives. The presence of the rescuers close to the edge of excavation could have added surcharge load and resulted in burying the second worker. Workers should have installed shoring immediately to prevent secondary collapse before beginning rescue operations.

On October 30, 2007, a contractor used a mobile crane to pour concrete for the basement of a residential building. The crane operator got too close to the edge of the excavated area, which became unstable and began to overturn (Fig. 4). A later investigation revealed that workers had failed to crib the outriggers of the crane. The boom of the crane struck a neighboring structure, preventing its complete overturn. The accident resulted in serious injury for the crane operator and another construction worker who was working nearby. The crane operator was caught in the rigging; while the other worker was struck by part of the crane (Al-Sayed 2007a,b). Numerous causes contributed to this accident. The crane should have been placed at a distance away from the excavated area. Without properly cribbing the outriggers, the crane support was unstable, although the soil condition appeared firm enough to support the loaded crane. Moreover, insufficient planning for crane operation and lack of training for the crane operator resulted in a hazardous condition of which the crane operator was unaware. Neither the supervisor nor a competent person was present when the accident occurred. A competent person, knowledgeable in recognizing such hazardous conditions can prevent such an accident, for instance, by ensuring adequate support for the crane, keeping the crane away from the unstable excavated area, and requiring workers to remain at safe distances from crane operations.

On December 17, 2007, the 26-year-old operator of a hydraulic excavator was killed, buried under the rubble of a five-story building (50-ft high) that collapsed during demolition [Figs. 5(a and b)]. Rescuers spent 2 h recovering his body (Al-Saidi 2007; Al-Sharhan 2007; Al-Yahyoh 2007). No formal investigation was conducted into the cause of the accident; however witnesses indicate that the operator was using a Caterpillar 225B LC, the maximum reach of which was 32 ft. Witnesses said that a single excavator was performing the demolition, and that it started at the top of the building. Thus, one can surmise that the machine could not reach the entire height of the structure. The operator may have tried to take a shortcut in the demolition process by using the Caterpillar bucket to strike at the lower part of the top story of the building and in doing so caused its uncontrolled collapse.

Demolition is perhaps one of the most dangerous construction jobs, especially in Kuwait, since workers are not normally aware of procedures or the structural condition of the building to be demolished. Although the contractor obtained permits before beginning demolition, witnesses report that the operator was working alone. Furthermore, the contractor instituted no formal safety program for this demolition operation. Although controlled demolitions using explosives are generally much safer than those involving heavy equipment, the contractor did not use such methods because of the costs involved. The demolition contractor could have used equipment with a better reach or equipment

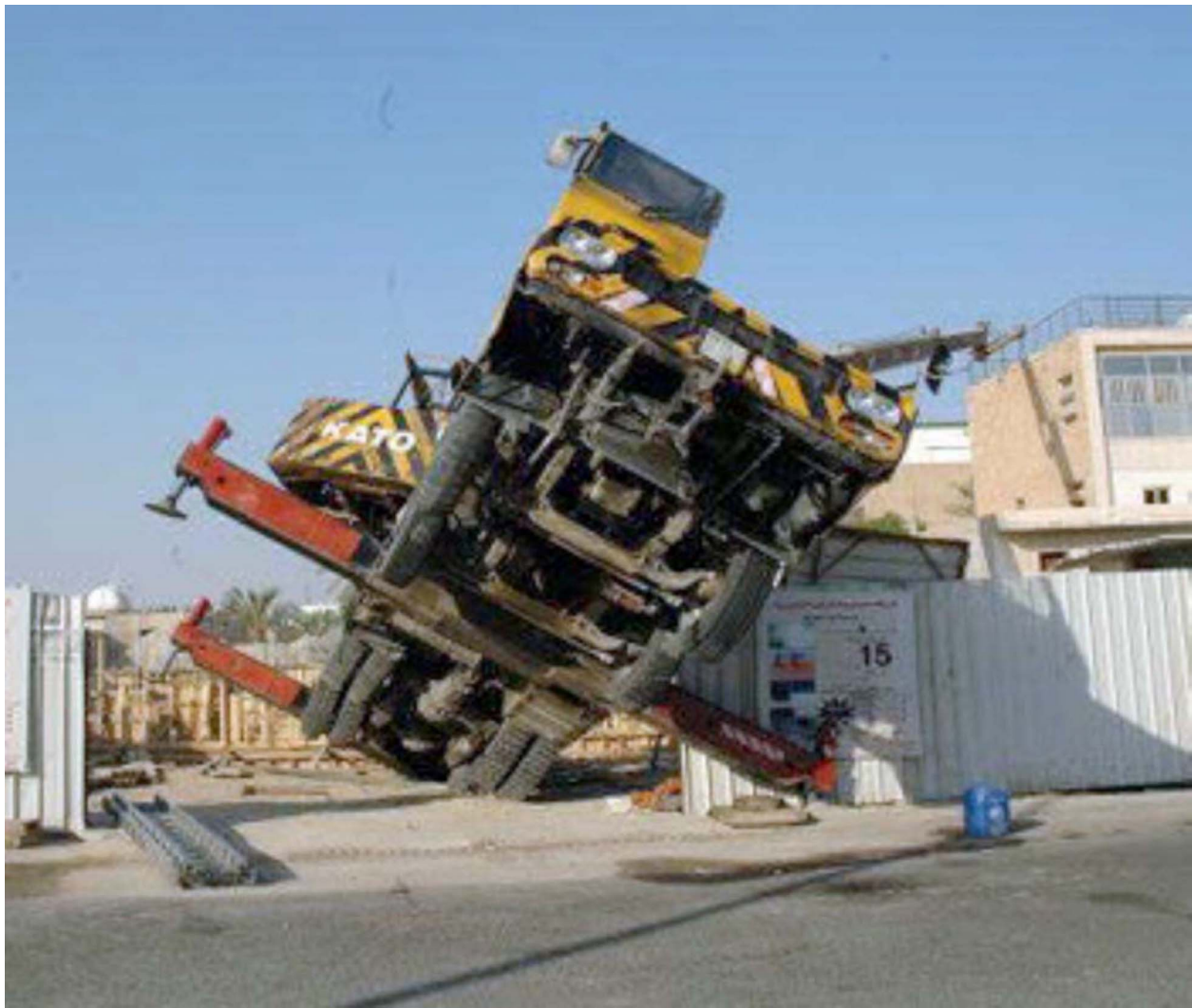


Fig. 4. Overturned crane (Photograph courtesy of Al-Watan)

that was more appropriate for the job, for example, a wrecking ball.

Demolition activities are common in Kuwait, which is becoming economically stable. Rebuilding is now commonplace. Safe demolition requires specific expertise and procedures that are currently lacking. Another example is the collapse of a 10-story building on October 21, 2007 during demolition, shown in Fig. 6. Fortunately, the accident did not cause fatality or injury (Al-Saidi 2007; Al-Sharhan 2007; Al-Yahyoh 2007). The collapse of the building resulted from lack of knowledge in demolition techniques. Instead of employing a derrick crane and wrecking ball, the contractor used an excavator. The building collapsed onto an empty lot on the opposite side of the operation.

A 33-year-old construction worker was killed on March 30, 2007, after being struck by a concrete slab. The slab fell apart during the renovation of a residential building (Fig. 7). The worker was killed instantly by severe head injuries (Zaki 2007). Although no one conducted a formal investigation of the accident, an engineering scenario can be drawn. The workers cut the rebar connecting the concrete slab to the front wall during brick removal, evidenced by the relatively clean cut of the rebar on the wall. The remaining two columns could not support the heavy canopy slab, and thus it fell and crushed the construction worker.

Similar to the previous cases, the contractor had implemented no formal safety program in this particular case.

Current Practices and Legislation

The population of Kuwait is 2.5 million, including 1.3 million foreign residents, making foreign residents more than 52% of population (Central Intelligence Agency 2008). Kuwaiti labor law covers labor rights. MSAL is responsible for the application of rules and regulations specified in Kuwaiti labor law. By examining the law, the following points were considered. According to Kuwaiti labor law, the right to join the labor trade union is confined to Kuwaiti citizens (Chapter XIII, Kuwait Private Sector, Kuwait Labor Law). Given that most workers on construction sites are non-Kuwaitis, the law fails to cover their rights.

Article 95, Chapter XV, of the general provisions of Kuwaiti private sector labor law states clearly that officials of MSAL have the right to inspect and supervise the execution of laws and implementation of labor safety rights. Most contractors agree that such inspections never take place and safety inspections are made by site engineers that work for the owner or the owner's representa-



(a)



(b)

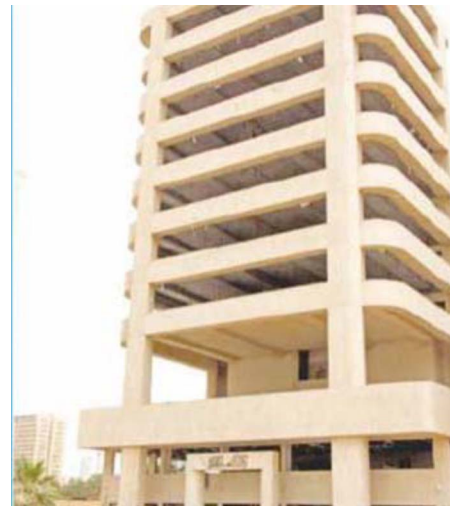
Fig. 5. (a) Rubble of a collapsed building buries an excavator and its operator (Photograph courtesy of Al-Rai Al-Aam); (b) rescuers trying to recover the body of the excavator operator (Photograph courtesy of Al-Watan)

tive. Kuwaiti labor law specifies that injury disputes be made solely on behalf of trade union members, that is, Kuwaiti Laborers, which fails to cover the rights of non-Kuwaiti laborers. Citation amounts range between Kuwaiti Dinar 100 to 200, equivalent to \$360 to \$720, for each worker that the citation affects. Many professionals interviewed believe that an increase in the monetary amount of the citation would help increase safety on site. In 2005, the MSAL passed a new law that prohibits workers from working in urban climate between 12 noon and 4 p.m. during the months of June, July, and August. This legislation helps prevent dehydration of workers due to summer hot weather.

According to the law, injuries suffered by laborers during normal working hours are classified into three categories, injuries, permanent disabilities, and deaths. In cases of injury, the worker is compensated according to the number of days needed for recovery recommended by medical examination. In cases of permanent disability, the laborer is compensated for the percentage of disability determined by the medical board (percent disability \times salary \times 2,000 days) or a compensation of approximately Kuwaiti dinar (KD) $(10,000 + 1/3 \times 10,000) = 13,333$ equivalent to \$48,000, whichever is greater. In the event of death, the laborer



(a)



(b)

Fig. 6. Before (a) and after (b) demolition of a 10-story structure (Photograph courtesy of Al-Rai Al-Aam 2007)

is entitled to a full pay for 1,500 days or up to a maximum amount of KD 10,000 equivalent to \$36,000. According to insurance company representatives, insurance covers most injuries and compensates workers because competition among insurance companies is very high and monetary compensation of injuries is minimal.

On-site safety standards are specified in the conditions of the contract, to which the project parties agree. Some projects specify British Safety Standards; others follow the OSHA regulations. Kuwaiti safety standards do not comply with international codes and standards. Lack of codes and standards that account for current construction operations in Kuwait contribute to safety problems and impede efforts to improve safety on Kuwaiti construction sites. The existing code was included in Kuwait labor law published in 1964 and amended in 1997. The International Labor Organization has been putting pressure on the MSAL to update the legislations to protect the rights of foreign laborers, but no legislation has been passed. In international construction related projects where international stakeholders are present, international safety standards are followed due to international rules which mandate international standards.

Different government authorities measure the safety of Kuwaiti construction sites, including the Administration of Safety at Kuwait Municipality (KM) and the Worker's Affair Department at MSAL; however, these authorities limit their sharing of information. Furthermore, the different authorities do not provide detailed reports of accidents. The data they provide only accounts for re-



Fig. 7. This concrete slab crushed a worker after being left insufficiently supported (Photograph courtesy of Al-Anba'a)

ported accidents, and they do not provide for the investigation of the causes of accidents. According to OSHA, a competent person is a person who can identify existing or potential hazards and has authority to take corrective actions to eliminate them (Occupational Safety & Health Administration 2008) (www.osha.gov). Such competent persons are typically absent from Kuwaiti construction sites; typically, they are replaced by site engineers who lack safety training, cannot identify potential hazards, or are constrained by limited resources, especially in very tight budgets. Although safety engineers hired by KM to conduct daily inspections on safety in construction sites have the authority to issue safety violations and warnings to contractors who adopt unsafe practices, few violations are recorded according to the KM records. Typical construction workers are uneducated and often have communication problems owing to their inability as foreigners to the local language. In addition, most construction workers come to Kuwait from very poor societies without their families, and such conditions can become very stressful and may result in negligence and accidents. On most construction sites, inspection of construction equipment is limited; such a practice may contribute to accidents.

Conclusions

The construction industry in Kuwait faces a safety problem, as construction workers account for an average of 40.1% of all work-related injuries for the years 1996, 1997, and 1999 to 2007. Construction workers are most often injured in falls, followed by being crushed or hit by falling objects. Injuries resulting from the use or misuse of tools are next common occurrences. An analysis of the statistics related to construction accidents in Kuwait reveals the extent of the safety problems on construction sites. To improve safety level in Kuwait, the government and the construction managers need to adapt changes to current practices.

The government needs to impose stricter rules, legislations, and construction related standards such as OSHA can be implemented to improve safety level. Modifications of local codes and legislation of on-site safety practices will also improve safety on construction sites such modification will be beneficial if lessons learned from prior accidents are taken into consideration. Improvement of on-site supervision and control should prevent accidents. Minimal monetary settlement of injury and death cases contributes to the negligence of contractors and subcontractors. In Kuwait, rules regarding compensation of workers injured or killed in accidents need to be modified. Labor unions are needed in Kuwait to protect the rights of laborers. A single authority equivalent to a competent person as defined by OSHA regulations who is responsible for safety on construction sites is needed. A detailed database of all construction-related accidents and the results of investigations into the causes of accidents would help improve on-site safety practices and minimize future accidents. An accident database with investigation of accidents to be shared among different Kuwaiti authorities and a single center responsible for construction project safety should be established.

Management of all stakeholders involved in the project is responsible for onsite safety level which includes all personnel working on site safety and public safety. Safety management and planning is needed at early project planning phase prior to construction activities take place to prevent unsafe working conditions. We believe that management, site engineers and construction workers need safety education to emphasize its importance at different levels. Furthermore, employers must begin to train all employees on site to recognize developing hazards; employers must ensure that a competent person performs designated duties of the position. Periodic site inspections to ensure safety precautions are undertaken should be conducted. Audits and lessons learned need to be implemented to improve safety level at different construction sites in Kuwait.

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