

# Evaluating the Occupational Health and Safety Practices in Small and Medium Construction Companies in Oman

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**Abstract—** Occupational health and safety in the construction industry have always been questioned due to the unpleasant rates of accidents, which results in injuries and sometimes death. All responsible bodies in the area of Occupational Health and Safety (OHS) are keen in providing safe and healthy working environments for construction labors. Governments and private institutes established OHS regulatory frameworks. However, the main challenge was related to what degree construction companies are following it. This research was conducted to evaluate the OHS practices in small and medium construction companies in Oman. OHS practices of ten construction companies in Oman from two different governorates were investigated. The results showed that the degree of implementation of the OHS regulatory framework was different from one company to another. The majority of the companies did not provide simple exposure prevention equipment and failed to provide OHS guidance board at their construction sites.

**Index Terms—** construction, OHS, Oman, Safety

## I. INTRODUCTION

Working in construction is becoming unpleasant for many workers because of the rise in fatalities and injuries. Many efforts extend to promote occupational health and safety. Lowering the gaze against the OHS practices in construction industry leads to social, environmental, economic, health and safety problems. The construction industry is unique to other jobs regarding the highest rates of injuries and deaths of workers. The incidence of non-fatal injuries and diseases exceeds the rates associated with many other industries. The construction industry includes a higher mortality rate than any other industrial sector [1]. Some studies have shown that a fairly large percentage of construction incidents can be eliminated, reduced or avoided by making better choices in the design and planning of any project. Building safety research at the design and planning stage can, therefore, have a significant impact on the reduction of injury and cost associated with project safety delays. Also, the construction industry plays an essential role in economics [2]. It represents about 10% of the world's domestic product besides that high number of fatalities related to

this field. This field employs about 6-10% of manpower as a result of occupational accidents which they registered is about 20-40 %. This indication is the highest in the developed nations; 60 000 fatalities per year were recorded in the construction industry [3]. The work in this field is dangerous; however, by following OHS international standards, local regulations, and a good safety management program, a good safe working environment can be maintained. OHS laws and standards are issued to manage and regulate the interaction between the workforce, and the other projects' components. The degree of implementation of such regulatory acts differs with respects to many factors such as the competitive tendering, lack of knowledge about OHS regulations, the primacy of OHS in a project etc. [4]. The degree of implementations of the OHS program in a construction project also depends on the rank of the construction company. Low-rank companies have limited resources which limit their spending in the area of OHS. On the other, high-rank companies have their health and safety policies and follow a well-structured health and safety programs.

The lack of knowledge and information about OHS in the construction industry and the limited application of the health and safety standards in Sultanate of Oman led to an increase in the number of accidents. The statistics have shown that Oman experienced a fatality rate of 18.9 % translating to 14393 accidents in this field [3]. Although occupational health and safety regulations are well established in Oman, the degree of implementations of such regulations varies dramatically concerning the rank of the construction company; however, all companies should follow the same regulations. Therefore, it is important to know why the variation exists in the implantation of the occupational health and safety regulations in Oman construction industry. Therefore, this research is motivated to evaluate the current practices in occupational health and safety in small and medium construction companies in Oman.

## II. BACKGROUND

The construction industry is considered as one of the significant industry throughout the world. It is the driving force of the global economy in general and in GCC in

particular. According to a survey conducted by Oxford Economics, the worldwide spending on capital projects and infrastructure was US\$4 trillion in 2012 and expected to increase to US\$9 trillion in 2025 [5]. In the GCC countries, the planned projects as of 2016 worth US\$2 trillion; 53% of the spending is devoted to construction [6]. Such gigantic expenditures provide a large number of jobs for skilled and non-skilled workers in construction. The construction industry, on the other hand, is always considered as one of the most dangerous workplaces [7]. It is characterized by small high-frequency accidents and diverse hazard sources [8]. From the fatality perspective, in 2015, a 19.4% of workers' fatalities in the United States was recorded in construction [9], and 29.9% of the same fact was reported in 2016 in Great Britain [10]. In the GCC region, ten years of construction-related accidents data in Kuwait were analyzed by Al-Humaidi and Tan [3] and shows that an average of 0.8 % of accidents results in a fatality. Senouci, Al-Abadi, and Eldin [11] state that 900 of workers' deaths were reported in Qatar infrastructure construction projects in the period between 2012 and 2015. Fass, Yousef, Liginlal, and Vyas [12] analyzed 519 incident reports from building sites in Bahrain, Qatar, the UAE, and Saudi Arabia and found that 8.6 % of all incidents result in a fatality. These facts highlight the importance of occupational health and safety programs in the construction industry and impose research development in such an area.

Occupational diseases and accidents continue to be the main causes of injuries and deaths among workers each year, with about 2 million deaths every year among all workers in the world. It is estimated that for every death, 500 to 2,000 work-related injuries occur. There are high mortality and injury rates in areas similar to the Middle East where 19,000 and more than 14 million work-related deaths and injuries occur each year. In other regions, such as Latin America and the Caribbean, there are approximately 30,000 and 23 million deaths and injuries, respectively, each year. In this context, the International Labor Organization has been organizing several regional meetings at different times to inform countries about occupational health and safety in the world and to advise them to help them improve their occupational health and safety situation. Arab countries distributed in Asia and Africa can attend regional meetings in Asia or Africa according to their location [1].

Many accidents in the construction industry occur without any warnings. Occupational health and safety are the essential parameters on site. These accidents happen due to unsafe working conditions, lack of awareness, lack of safety experience of workers, and working without permissions. Occupational accidents and diseases are the main causes of injuries and deaths among workers. Labor-related deaths in the Middle East were estimated at 19,000 in 2005 [13]. To prevent workers from being exposed to such risks, the International Labor Organization has worked to raise awareness in the world on this issue, there are many risks and gaps in the work environment, and they suggest many methods to deal with and provided all kinds of assistance to bring about

actual changes. With the negative impact of work-related diseases and injuries on workers' health and productivity, and therefore their families, economic situation and social well-being in the country, awareness of occupational health and safety has increased throughout the world. Although the construction industry in the Middle East attaches significant importance to the occupational health and safety, the current practices may show that implementing the best practices and following the local and international standards is not part of the small and medium construction companies' plans [13]. It is maybe because of the poor attitude towards safety and health as Zheng, Tam, and Tam [14] commented that the lack of awareness of safety, inadequate safety regulations, poor knowledge and technical capacity, ineffective implementation or application of safety standards, and poor attitudes towards safety and health are also common in developing countries.

### III. SMALL AND MEDIUM ENTERPRISES (MSEs)

MSEs around the world have become a labor contract for large numbers of young people, as well as for older workers seeking entrepreneurial goals. Most small and micro enterprises are informal in their structure, and their activities are flexible, unsafe, dangerous and occur in an unhealthy and unsafe environment. A similar scenario prevails in Oman when statistics indicate that SMEs represent 99% of the total number of active private companies which are close to 31% of GDP. Also, the figures issued by the General Authority for Social Insurance (GASI) indicate that the number of occupational disabilities and deaths of Omani nationals working in the private sector increased by 70% and 60%, respectively last two years, in 2010 and 2011. Overall, occupational deaths and injuries cost about 4% of Oman's GDP. It was realized that Oman did not have a separate occupational health and safety policy (OHS) for small enterprises and that occupational health and safety regulations were limited to formal Government and some semi-government large and medium enterprises only [15]. The categorization of construction companies in Oman is according to their capital, and there are five categories and listed as follows [16]:

- Category, Excellent (+250,000 OMR)
- Category, First (100,000-249,000 OMR)
- Category, Second (50,000-99,000 OMR)
- Category, Third (25,000-49,000 OMR)
- Category, Fourth (3,000-24,000 OMR)

### IV. COMPARISONS BETWEEN SMALL AND MEDIUM COMPANIES

The responsibilities of employers which employ 10 or more workers are specified in detail to cover the organization's occupational safety and health policy, including the organization and management of occupational health and safety, specific risks, contingency plans, training, monitoring and testing of protective materials, Medical, accident investigation and arrangements to deal with workers' complaints. The

Occupational Health and Safety Policy and Program of Work is subject to the approval of the Department or Department concerned at the Ministry of Manpower [17]. Institutions with 50 or more workers are required to employ a qualified occupational health and safety supervisor as defined in article 1. They are also required to submit periodic reports on statistics on serious accidents, occupational injuries and diseases on a semi-annual basis. Notification of accidents, injuries and diseases must be submitted in writing within 24 hours of occurrence, and PASSI notified to the insured workers [17].

The importance of small and medium-sized enterprises in terms of numbers, SMEs dominate all economic sectors of countries around the world. For example, in 2003, there were 19 million institutions located in Europe to employ 140 million people. On the other hand, there were only 40,000 large companies representing 0.2 % of all enterprises. Moreover, about 98 per cent of the 5.9 million companies in the United States have fewer than 100 employees. In developing countries such as Ghana, small and medium-sized enterprises account for 95 % of registered enterprises [18].

#### V. OHS PRACTICES EVALUATION APPROACH

The OHS evaluation approach adopted in this paper is simply using visual data to compare the current occupational health and safety practices by the small and medium construction companies against the OHS regulations. It is worth mentioning that this research is part of a comprehensive research work conducted by the authors in the area of occupational health and safety in Oman construction industry. This part of the work represents the first stage objective to stand on the actual safety practices by the small and medium construction companies.

The OHS regulation adopted in the country was studied and used to prepare a checklist of all major elements. The regulatory framework for the occupational health and safety at the sultanate level was established by the Minister of Manpower, Oman and regulated by the Ministerial Decision No. 286/2008. The regulatory framework discusses general provisions concerning safety at work and protection of the health of workers in the private sector. The regulatory framework explains articles such dangers of machinery, working conditions such as lighting, ventilation, etc., health hazards, accidents, and safety supervisors.

The checklist used in the research work was structured in the form of an evaluation sheet, and it was used to evaluate construction companies from two different governorates in Oman, Muscat and Al Batinah. The evaluation sheets include the following elements:

1. E1: Categories of the construction companies and the type of project performed.
2. E2: Construction site info, and it includes three sub-elements;(1) the nature of the construction site whether it is only a construction site or a construction site and accommodation at the same time, (2) construction site fencing, and (3)

the availability of OHS guidance board at the entrance of the construction site.

3. E3: Mechanical exposure and in terms of flooring, electrical connections, and gas storage facility.
4. E4: Biological exposure in terms of providing human waste management system.
5. E5: The availability of exposure prevention methods (PPE).

#### VI. OHS EVALUATION RESULTS

In this section, the results of each evaluation element will be discussed individually.

##### *E1: Categories of the Construction Companies and the Type of Project Performed*

The collected data for evaluating the health and safety practices in small and medium construction companies were collected from Muscat and Al Batinah governorates. Five construction projects data from each governorate were collected and analysed. All of the construction companies were involved in constructing residential projects. The distribution of the categorizes of the construction companies in Muscat was two companies were under the first and second rank construction company, and three companies were under the third rank. Al Batinah's sampled construction companies categories were two companies under the third rank construction company, and three companies under the fourth rank.

##### *E2: Construction Site Info*

Most small and medium scale construction companies prefer to provide accommodation for their labor in the construction site. This approach can save money in terms of minimizing the accommodation renting and transportation cost. However, this approach controversially when it comes to the condition when the accommodation is within a very short distance from the construction site, and some time it when the labor accommodation is actually inside the construction site. It is important to know the nature of the studied construction site so that it can be correlated, in the future part of this research, to the accidents rate and the type of accident recorded.

The collected data showed that all construction sites in Muscat are construction and accommodation site at the same time. In Al Batinah, three construction companies had the labors accommodation within the construction site, and the other two companies were accommodating their labors away from the construction site.

Regarding whether the construction companies were completely enclosed with fence or not. The collected data showed that all of the construction companies in Muscat enclose their construction with a fence, see Fig. 1. However, not all of the companies in Al Batinah enclose their construction sites with fences, see Fig. 2.



Figure 1. Construction site in Muscat surrounded by a fence

Providing the OHS guidance board at the construction site entrance is an important method to raise awareness, educate employees and encourage them to adhere to healthy and safe work behaviors. Unfortunately, none of the construction companies from both locations has provided the OHS guidance board. This is unpleasant findings where the studied construction companies did not adopt a simple OHS approach.



Figure 2. Construction site in Muscat surrounded by a fence

*E3: Mechanical exposure and in terms of flooring, electrical connections, and gas storage facility*

Three mechanical exposure were studied, flooring, electrical connections, and the availability of gas storage. Providing a clear flooring area and managing the construction site is important for construction labors to

work efficiently and to move smoothly. The accumulation of wood, scaffolding, cement bags, dumping concrete waste, and stones may lead to serious danger. The studied construction companies in both Muscat and Al Batinah were not concerns about providing a safe working area, see Fig. 3.



Figure 3. Poor flooring conditions

Maintaining good electrical wiring and routing is necessary to do to avoid any serious danger like getting an electric shock. One construction companies in Muscat provided good electrical wiring and routing in the construction site, and the rest of the companies did not. None in the Al Batinah region provided good electrical

wiring. Fig. 4 below shows sample pictures of bad electrical wiring and routing. The same findings were also reports regarding the availability of a gas storage facility. Only one company in Muscat provided the gas storage facility.



Figure 4. Bad electrical wiring and routing



**E4: Biological Exposure in Terms of Providing Human Waste Management System**

Construction waste is of many types and shapes. Neutralizing such waste is important to achieve zero-effect to the environment. Most of the construction companies manage the solid waste such wood and concrete products generated during construction; however, there is also a type of waste generated during construction but not directly related to the construction operation. It is the biological waste produced by the construction labors life activities during their stay at the construction site. Not providing a proper biological waste management system creates a hazardous environment to not only to the labors, but to the society as well. Evaluating this part of the OHS evaluation process resulted in finding that none of the construction companies provided a good waste management system. Moreover, the biological waste was directly injected in a shallow bit in the construction site, see Fig. 5.



Figure 5. Shallow pit used to accumulate biological waste

**E5: The Availability of Exposure Prevention Equipment or PPE**

This part of the OHS evaluation is concerned with providing a safe outfit for construction labors. It focuses on evaluating the use of eye (e.g. protective eye goggle), head (e.g. protective helmet), hand (e.g. protective gloves), ear (e.g. protective earplugs), and foot (e.g. safety boot) protection tools. Also providing coverall outfit was evaluated. Table I shows the results of the collected observations. It can be seen from Table I that only one first rank construction company in Muscat has provided all of the observed exposure prevention equipment. Three third rank companies provided safety boots for their labor, and one of them provided the coverall outfit.

On the other hand, none of the Al Batinah observation data showed that the studied companies provided eye and head protection equipment, and one third rank construction company only provided hand protection and earplugs. In terms of safety boots, two of the third rank and one of the fourth-ranked companies maintained safety boots for their labors. Besides, two of the third rank and two of the fourth rank companies have provided coverall outfit. It worth mentioning that some of the construction companies they do provide PPE equipment, but unfortunately, their construction labors avoid wearing it. However, in this research words provided and not provided in the context of the evaluation were used because construction companies have the authority to enforce their labor to use the exposure prevention equipment and it is assumed that if no exposure prevention equipment was observed, then it is considered as not provided.

TABLE I. THE NUMBERS AND RANK OF THE CONSTRUCTION COMPANIES PROVIDED SUITABLE EXPOSURE PREVENTION EQUIPMENT IN BOTH MUSCAT AND AL BATINAH GOVERNORATES

PPE	Muscat (out of 5 companies)	Al Batinah (out of 5 companies)
Eye protection	One first rank company	None
Head protection	One first rank company	None
Hand protection	One first rank company	One of the third rank company
Earplugs	One first rank company	One third rank company
Safety boot	One of the first rank company, and three of the third rank companies	Two of the third rank companies, and one of the fourth rank company
Coverall	one first rank company, and one third rank company	Two of the third rank companies, and two of the fourth rank companies.

**VII. CONCLUSION**

In this research, the occupational health and safety practices in small and medium construction companies in Oman were studied and evaluated. Ten construction companies from two governorates, Muscat and Al

Batinah were evaluated. The evaluation was simply by using visual data to compare the current occupational health and safety practices against the OHS regulations. The findings in this research work showed the degree of implementation of the regulatory framework for the occupational health and safety was different from one company to another, and it was not implemented

sufficiently. It was also found that none of the companies provided a simple OHS guidance board at their construction sites.

Furthermore, none of the company provided sufficient biological waste management systems, and some of the company did not pay attention to the hazards which may be associated with the mechanical exposures. Furthermore, some of the construction companies did not sufficiently enclose their construction sites with fences, although it enforced by law by Muscat municipality and the other regional municipalities. Also, simple exposure prevention equipment such as goggles and helmets were missing. These findings are a heads up call for putting more attention on the implementation of OHS regulatory framework by the small and medium scale construction companies in Oman and encourage researchers in this area in Oman to improve and develop new methods and approaches for the occupational health and safety in the construction industry in Oman.

#### CONFLICT OF INTEREST

The authors declare no conflict of interest.

#### AUTHOR CONTRIBUTIONS

Amjaad Al Ghafri conducted the research, analyzed the data and wrote the paper; Mubarak Al Alawi wrote the paper; Mohammed Al Shahri wrote the paper.

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