



Construction safety practices and challenges in a Middle Eastern developing country



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ABSTRACT

The construction industry remains one of the most dangerous industries in the world accounting for a high percentage of work-related injuries and fatalities despite the establishment and implementation of safety programs in several developed countries. In developing countries where safety and health programs are still at their infancy or lack proper implementation, the situation is more critical. Lebanon, a small developing country in the Middle East region, has been witnessing a substantial growth in its construction market. However, achieving a safe work environment has been an ongoing challenge. This study aims at assessing current safety practices in the Lebanese construction industry through conducting one-to-one interviews with the different parties concerned including contractors, consultants, owners, insurance companies and governmental authorities. The study revealed the existence of construction labor safety law but the absence of its enforcement, the initiation of safety programs but the lack of any monitoring or follow-up, and a lack of safety education and commitment from all parties involved. The paper concludes with highlighting potential venues for enhancing safety awareness and adoption in Lebanon, which may be of insight to other developing countries in the region.

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1. Introduction

To complement the exponential increase in the world population, the construction industry has exhibited extensive growth in the past years. The need for more shelters, workspaces, infrastructures, and facilities continues to expand the construction market which has become a substantial sector of every economy. In the United States, the construction industry alone contributed to 3.8% of the total GDP in 2009 (U.S. Bureau of Economic Analysis, 2011). However, construction work has been associated with high numbers of work related injuries and fatalities which reached 50% higher than any other industry in the U.S. (Huang and Hinze, 2006). The situation is not any better in China and Australia where incidents related to construction work have exceeded in number those resulting from other industries (Zou, 2011). Such high injury rates may be attributed to the characteristics of construction work which greatly depends on the use of heavy machinery and necessitates work under unfavorable conditions (Hallowell and Gambatese, 2009).

As construction risks are high and worker-hazard interactions are inevitable, safety systems have been developed to prevent

injuries and accidents. Unlike developed countries which have invested significant efforts to devise extensive safety standards aiming at zero injury policies (e.g., OSHA in the US), construction safety in developing countries is still at its infancy (Bust and Gibb, 2006; Koehn and Reddy, 1999; Aires et al., 2010). Poor safety performance in these countries can be attributed to uncooperative clients, improper enforcement of regulations, and inadequate work procedures (Bust and Gibb, 2006). The case in Middle Eastern countries has not been any better (Alkilani et al., 2013; Hassanein and Hanna, 2008; Kartam et al., 2000). In particular, Lebanon, a small developing country in the Middle East region exhibiting an exponentially growing construction sector in the aftermath of a long civil war, has not shown any major leap towards safety adoption despite the high costs associated with work-related accidents. The country's construction industry constitutes 4% of its total GDP (United Nations Development Programme, 2014), and employs about 9% of the total labor force managed by the Lebanese Ministry of labor (Central Administration of Statistics, 2011). The industry consists mostly of unskilled foreign workers mainly of Syrian origins working at low wages. Unemployment rates have always been high in Lebanon (8.9% in 2012) and moreover, a recent study released by the World Bank expects these rates to double due to the impact of the Syrian political conflict on the country (World Bank, 2013). Thus, with limited employment opportunities, low wage workers

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are willing to take unacceptable risks to keep their jobs (Koehn and Reddy, 1999; Guldenmund et al., 2013).

Despite the high levels of accidents and the lack of awareness about the ramifications of an unsafe workplace, there have been no research studies pertaining to the safety awareness and practices in the Lebanese construction industry except for one study by Fayad et al. (2003) which rather aimed at estimating the cost of work-related injuries in insured workplaces. The former study gathered and analyzed data about medical and compensation costs per work injury in several employment sectors with the highest percent of data (43%) coming from the construction industry. The conducted analysis showed that the average cost per injury excluding human value cost was around \$189 in the construction sector in 1998 which is a considerable amount for such a small-scale market like Lebanon characterized by a constantly fluctuating economy. This sole study about workplace safety in Lebanon highlighted the economic burden occupational injuries inflict on the country; nonetheless, it did not give the construction community enough impetus to call for further action or research in order to raise awareness about the importance of safety and take the necessary measures. In fact, the absence of any governmental efforts to keep record of accident injuries and fatalities on construction sites makes safety the least of a contractor's or developer's concerns (International Labor Organization, 2010). Thus, there is an urgent need to assess the current safety practices in the Lebanese construction market, to understand the perceptions of different constituents about safety, and to devise improvement channels. This paper is the first to evaluate the status quo of safety awareness and implementation in the Lebanese construction sector and to present a comprehensive assessment and interpretation of the relevant weaknesses, challenges, and improvement potentials. Data about the current working conditions, obstacles and primitive initiatives were gathered through a series of one-to-one interviews with key players in this field including contractors, owners, consultants, insurance companies, and key governmental bodies.

This paper first provides an extensive literature review about construction safety adoption and weaknesses in some developing countries and sheds light on the gap in safety performance with developed countries. Then, the adopted research methodology is explained including developed questionnaires used in the interviews with the different construction entities and conducted statistical analysis to test the significance of the survey results. This is followed by a presentation and discussion of obtained responses by contractors, consultants, owners and insurance companies. Then, findings from semi-structured interviews with key governmental entities are included along with an overview of Lebanese safety regulations and their limitations in comparison with OSHA standards. Finally, the paper concludes by summarizing the

obstacles towards a safe work environment in the Lebanese construction market, devising recommendations and identifying potentials to enhance the country's safety practice and commitment, which may be enlightening for other developing countries in the surrounding region.

2. Construction safety in developing countries

The construction industry is one of the most dangerous industries which has resulted in the highest number of occupational injuries and fatalities in the past years (Rosenfeld et al., 2006). Although construction work shares the same high risk nature all over the world, King and Hudson (1985) revealed that fatalities in developing countries are three times as many as in developed countries. A study by Hamalainen et al. (2006) further affirmed that developing countries witness the most cases of accidents and fatalities. For instance, the study reported that occupational accident and fatality rates in the Middle Eastern Crescent (14,218 and 18.6 per 100,000 workers) exceed by far rates in established market economies (3240 and 4.2 per 100,000 workers).

Many studies have been conducted in developing countries that aimed at evaluating current safety practices and investigating the causes behind poor safety performance. The main causes for the high injury and fatality rates reported in most of the reviewed literature are extensive subcontracting, absence of safety training, lack of safety awareness, inefficiency of safety regulations and legislations, and unsupportive top management. Because subcontractors are simple in structure and lack safety commitment due to resource limitations, extensive subcontracting can be a major reason for poor safety performance (Wong and So, 2002). Moreover, the absence of adequate safety training for workers and top management is also reported as a main reason for poor safety climate in Saudi Arabia, China and Pakistan, beside other factors such as lack of awareness, absence of personal protective equipment, first aid and safety officers (Berger, 2008; Tam et al., 2004; Farooqui et al., 2008). Inefficacy of regulations and policies is also mentioned among main causes of poor safety environment (Alkilani et al., 2013). For example, Koehn et al. (1995) attributed the bad safety records in India to the improper enforcement of laws and regulations and to corruption that is caused by bureaucratic controls where accidents are not reported and in case reported, they are settled through cash payments. Table 1 provides an extensive list of the above causes among others as identified in prior articles on the subject.

Further studies were conducted in the literature to investigate the causes of the disparity in accident rates between developed and developing countries. Two of the latter focused on comparing safety and health systems in South Africa versus Singapore, and

Table 1
Causes of poor construction safety performance in developing countries as per the literature.

Poor safety performance caused by	Reported in	According to
Extensive subcontracting	Hong Kong, Kuwait, Uganda	Wong and So (2002), Al Humaidi and Tan (2010), Iumba (2014)
Absence of adequate safety training	China, Saudi Arabia, South Africa	Tam et al. (2004), Berger (2008), Teo et al. (2008), Zou and Zhang (2009)
Absence of safety officers on site	China, Saudi Arabia, Uganda	Tam et al. (2004), Berger (2008), Iumba (2014)
Ineffective laws and lack of enforcement	Honduras, India, Malawi, Jordan	Recarte Suazo and Jaselskis (1993), Koehn et al. (1995), Chiocha et al. (2011), Alkilani et al. (2013)
Extensive use of foreign workers	Kuwait	Kartam et al. (2000)
Lack of workers' self-protection and awareness	Pakistan, China, Jordan	Farooqui et al. (2008), Zou and Zhang (2009), Alkilani et al. (2013)
Uncooperative clients and inadequate work procedures	Botswana, Egypt, Nigeria, South Africa	Bust and Gibb (2006), Teo et al. (2008)
Poor accident record keeping	Kuwait	Kartam et al. (2000)
Lack of management commitment to safety budget allocation	Kuwait, South Africa, Malawi	Kartam et al. (2000), Teo et al. (2008), Chiocha et al. (2011)

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