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## **Cost of Accidents in Construction Industry of Oman**

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**Abstract:**

In this article, the ongoing and planned projects for financial year 2015-2016 in different sectors in Oman are presented. While specific focus is on the construction industry, the costs of accidents associated with projects in different sectors are estimated by two criteria, considering the number of workers and projects value. Although the cost of accidents is accumulating to a huge amount, construction organizations and the government can play their role in reducing the number of accidents and thus the total costs of accidents in construction. The financial benefits of preventive cost of the accidents are discussed briefly. A better understanding of the financial benefits of improved safety performance will encourage construction organizations in Oman to enhance their safety performance. The role of a safety and health regulatory organization for conducting inspections and enforcement of safety and health law is significantly important for overall construction safety improvement. Such organization will not only improve the safety and health performance in construction and other sectors, but will also be a source of revenue and a support to the country's economy. For a more reliable and true cost of accidents, further research is recommended considering Oman's construction specific factors to estimate the cost of accidents.

**Key Words:** Health & safety, Management, Safety & hazards

**1. Introduction:**

Construction is a major industry providing jobs to millions of people and contributing to the country's and the world economy. Contribution towards the Omani economy is around 10% of the total GDP and employs 18% of the total population (NCSI 2015). The ongoing and planned construction projects in Oman for financial year 2015-2016 amount to a total value of US \$

43.160 Billion. This includes the largest project ‘‘ Oman Rail’’, which is in pre-execution phase with a total length of 2,135 kilometers and a budget of US\$15.6 billion. 43% of the total population of Oman consists of foreigners and up to 83% of the total population of foreigners is employed by the private sector (GLMM 2015). The construction industry is rapidly growing and has huge potential for employment for Omani nationals, which is currently at 8% only. The construction industry in Oman is highly populated by foreign workers and employs up to 37% (644,000) of total foreigner population (NCSI, 2015). The total number of work force in the construction industry in Oman is approximately 700,000 (OSC, 2016; NCSI, 2015).

Oman’s economy is heavily reliant on oil and gas revenues, which accounted for about 84% in 2014 of the country’s export earnings and 47.2% of its gross domestic product (CBO, 2015, NCSI, 2015). Currently the oil price in international market is at lower and thus it is affecting the Oman economy. The government is trying to reduce their expenditure and support the economy by finding alternative sources of revenue.

In this article an overview of Oman’s construction industry is given and the cost of accidents in construction is estimated. There is a huge potential in the Oman construction industry to reduce the cost of accident in construction by improving safety performance, which can help both the construction organizations and the government in controlling their expenditures. The ratio analysis of a research conducted in UK on cost and benefit analysis revealed that when total costs of accident prevention were compared to the total benefits of accident prevention, the benefits far outweigh the costs of accident prevention by a ratio of approximately 3:1, which means that when contractors, irrespective of their sizes, spend £1.00 on accident prevention, they

gain £3.00 (Ikpe et al 2012). In the UK and USA, the numbers of accidents in different industries including construction significantly reduced after establishment of independent organizations, responsible for making safety and health rules and regulations, conducting inspection and enforcing safety and health law. The Health and Safety Executive (HSE) in the UK and Occupational Safety and Health Administration (OSHA) in the USA are the organizations responsible for overall safety and health matters in all industries. In Oman, the Ministry of Manpower is currently carrying out these responsibilities with limited resources and staff.

## **2. Projects in Oman:**

The largest project in Oman which is in pre-execution phase is Oman Rail (Oman National Railway), with a total length of 2,135 kilometers (km) and has a budgeted value of US\$15.6 billion. It will be executed in nine segments and completed by 2022. It is divided into several segments linking Oman's borders with the UAE to Muscat as part of the GCC Railway Network. It will also link to the southern parts of the country, including the port of Al Duqm, port of Salalah and the Yemen border. The railway line will be doubled track, non-electrified and designed to serve mixed freight and passenger. The map of the proposed Oman rail network is shown in figure 1.

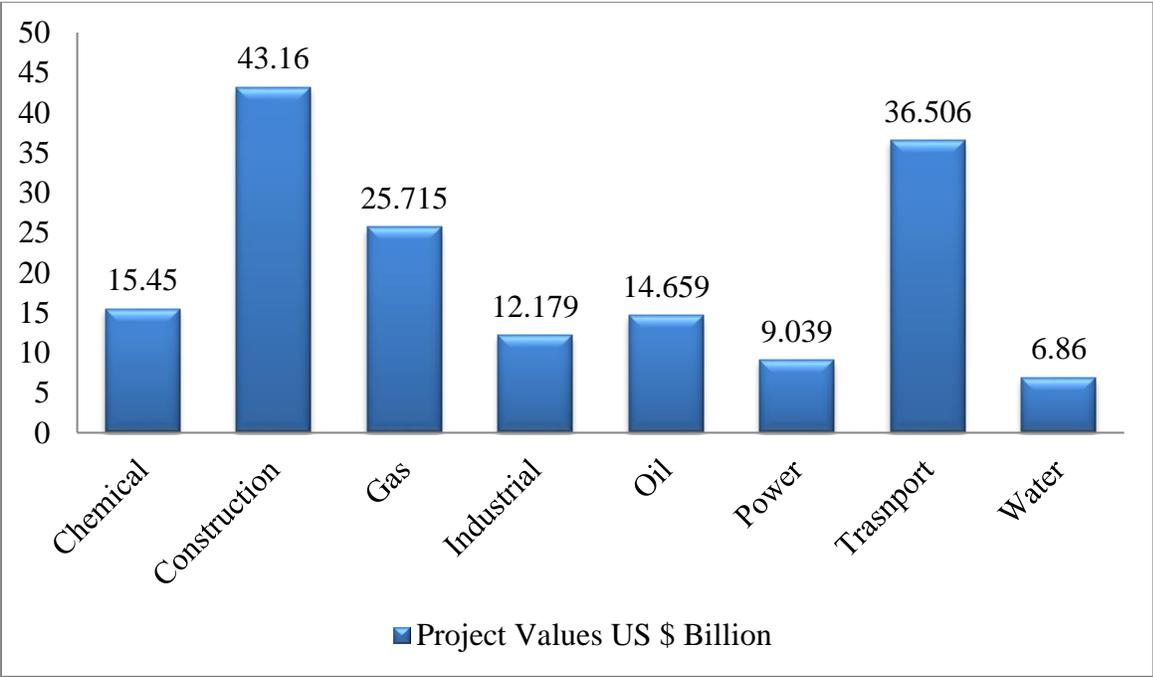


**Figure 1. Oman Rail Network (Oman Rail, n.d)**

The next two largest projects, which were expected to be awarded in 2015-2016 financial year, have the values of US\$1.7 billion and US\$1.3 billion. The first project is “Liwa Steam Cracker and Polyethylene Project” of Oman Oil Refinery and Petroleum Industries Company for

enhancing both fuel and plastics production. The second project is “Liquid Terminal Project” of Special Economic Zone Authority at Duqm, which is designed to handle the increase in liquid volumes associated with a large scale refinery and petrochemicals hub envisioned at the Special Economic Zone.

By looking at ongoing and planned projects in different sectors in Oman including those which are expected to be awarded in financial year 2015-2016, the construction sector projects stand out as the largest one, amounting to US\$ 43.160 Billion (Deloitte 2015). The values of ongoing and planned projects, in different sectors of Oman are shown in figure 2. These values include the projects which were started earlier (before 2015), but still not yet completed.



**Figure 2. Values of Ongoing and Planned Projects in Different Sectors of Oman (Deloitte 2015)**

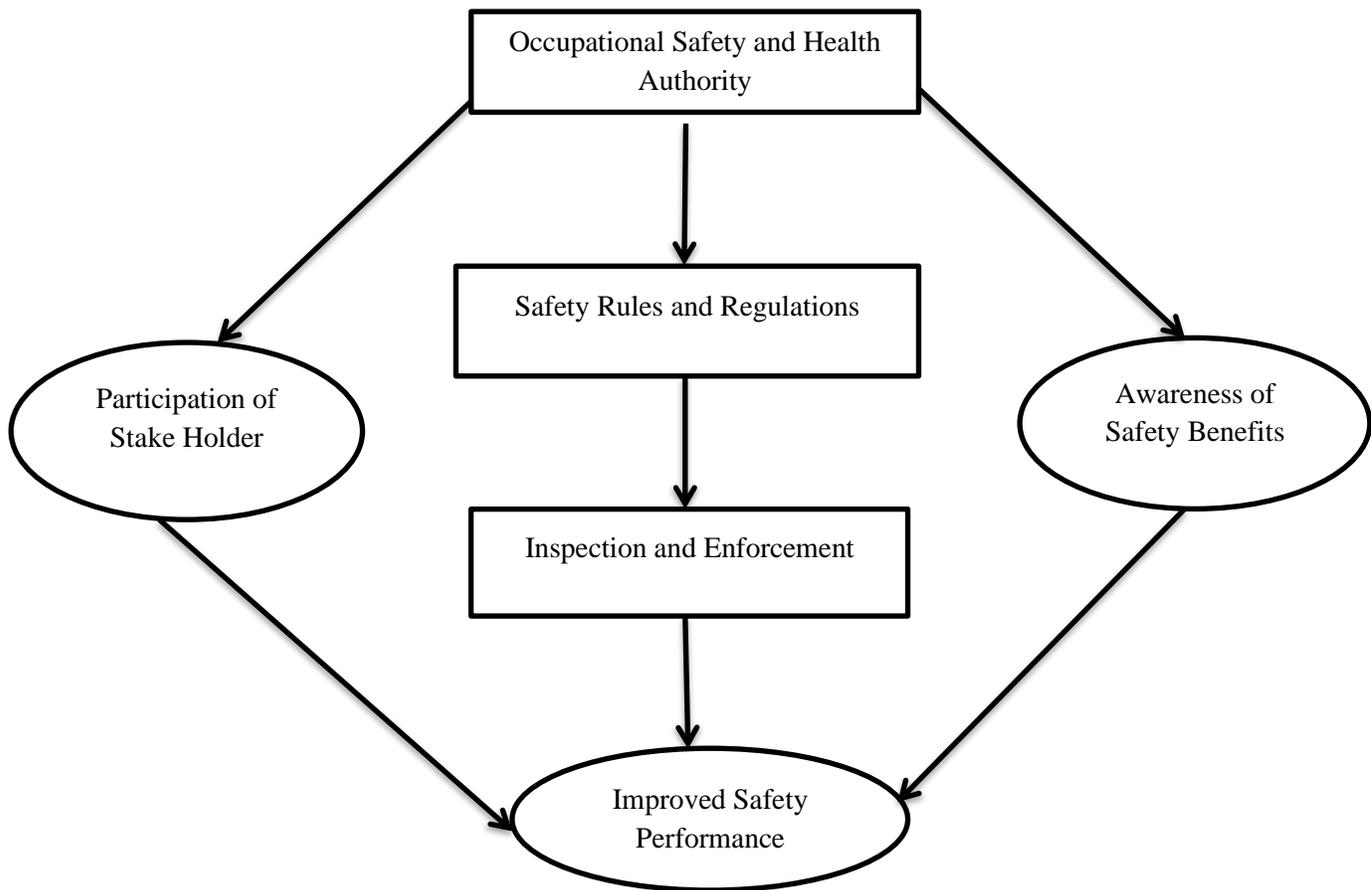
### **3. Construction Safety in Oman:**

Worldwide occupational injury rates in construction are higher than other major industries (Lehtola et al 2008). Unlike other industries such as manufacturing, construction is composed of a transient workforce (Kadefors, 1995; Dubois and Gadde, 2002), where project personnel from different cultures and backgrounds are expected to work together in the constantly changing work organization and structure. Construction is always risky because of outdoor operations, work-at height, complicated on-site plant machinery and equipment operation coupled with worker's attitudes and behaviours towards safety (Choudhry and Fang, 2007). Statistics published by the International Labor Organization (ILO, 2016, n.d) indicated that at least 108,000 workers are killed on construction site every year, a figure which represents about 30 % of all occupational fatal injuries. Data from a number of industrialized countries show that construction workers are 3 ~ 4 times more likely than other workers to die from accidents at work. In the developing world, the risks associated with construction work may be 3 ~ 6 times greater. In the UK, the injury from construction sector accounts for over half (US\$ 0.7 Billion) of the total cost associated with health and safety (US\$ 1.29 Billion) and approximately 7% of the total cost of health and safety (US\$ 20.43 billion) across all industries (HSE, 2015).

Costs associated with accidents in the construction industry can be categorized as direct and indirect costs. Direct costs tend to be those associated with the treatment of the injury and any unique compensation offered to workers as a consequence of being injured and are covered by workmen's compensation insurance premiums. Indirect costs include reduced productivity for both the returned worker(s) and the crew or workforce, clean-up costs, replacement costs, costs

resulting from delays, supervision costs, costs related to rescheduling, transportation, and wages paid while the injured is idle (Hinze, 1994). Research conducted in the UK showed that indirect costs are eleven times more than direct costs (Mfi, 2003). In the USA, the total cost of accidents constitutes 6.5% of the value of completed construction (BRT, 1995). In the UK approximately 8.5% of tender price (Anderson, 1997).

In terms of safety performance the construction industry in Oman is not good as in the UK and USA. Therefore it is anticipated that the cost associated with construction industry could be comparatively more. An internet based search covering six months (May 2015 to November 2015) of one daily newspaper shows that nine construction workers were killed and twenty five were injured in Oman at different construction sites. These were major accidents in construction sites located in cities. There could be accidents happened in construction sites which were not reported in the newspaper because it may happen in a remote area or the accidents were minor involving less casualties and injuries. A model for construction safety improvement proposed by Umar and Wamuzir (2016) focuses on the needs of an overseeing body (figure 3) responsible for safety regulations, inspections, enforcement and to promote safety awareness in construction organizations including financial benefits. Although the true cost of accidents in construction needs to be carefully calculated considering construction industry specific factors, in this article, a rough cost of construction accidents in Oman is estimated considering two criteria: a) number of total workers and b) cost of the projects.



**Figure 3. Proposed Safety Improvement Model (Umar and Wamuziri 2016)**

### **3.1 Cost of Accident based on Number of Workers:**

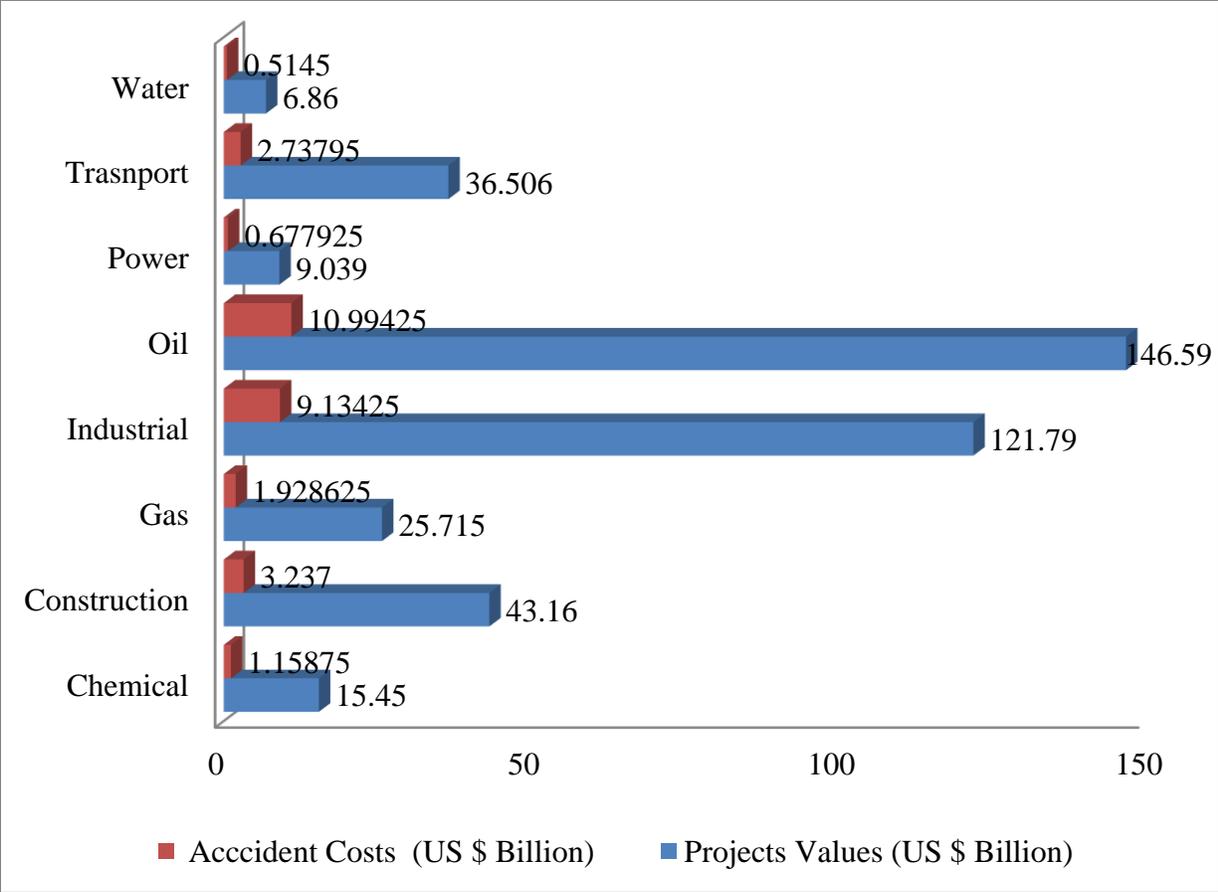
The annual report of the year 2014 of the Public Authority of Social Insurance (PASI) in Oman, which registers only Omani nationals' showed that 401 cases of work related injuries were disbursed, which cost a total amount of US\$ 1,055,600 (PASI 2014). The number of active insurees in the Social Insurance System was 197,510 in 2014, so the average cost of the accident was US\$ 5.35 /insure/ year. This can be applied to the total number of workers (700,000) in the

construction industry of Oman. Then the cost of accidents in construction is estimated as US\$ 3.74 Million per year.

The amount disbursed by PASI is the sum of different benefits, such as compensation for non-attendance to work, lump-sum Compensation for injury, permanent partial occupational disability pension, permanent total occupational disability pension and death pension due to occupational reason. Therefore the costs of accidents in construction estimated by this method is not reliable as this method just includes the cost of compensation in case of injury or death, and don't includes the costs associated with the treatment of the injury, reduced productivity for both the returned worker(s) and the crew or workforce, clean-up costs, replacement costs, costs resulting from delays, supervision costs, costs related to rescheduling and transportation etc.

### **3.2 Cost of Accident based on Project Cost:**

The cost of accident in the USA was estimated as 6.5% of the total value of completed work and in the UK it is approximately 8.5% of the tender value (BRT, 1995, Anderson, 1997). The cost of accident associated with construction in Oman can be estimated is determined based on the average of those two values, that is 7.5%.  $\{(6.5\%+8.5\%/2) = 7.5\%$  }. In Oman the construction projects in 2015 were amounted to a value of US\$ 43.160 Billion. So the cost of accidents in construction is estimated as US\$ 3.237 Billion. Figure 4 shows the cost of accident associated with construction and other projects estimated by above criteria.



**Figure 4. Projects Values in Different Sectors for Year 2015-2016 and Accident Costs in Oman**

The two methods used to estimate the cost of accidents in construction give two different answers as these estimates are based on the number of workers and the project value. Apart from this, the first method gives the cost of accidents per year, while the second method gives the costs of accidents based on the ongoing construction project values keeping in mind these projects can be in progress for a number of years. Therefore, these estimates cannot be linked with each other. The estimated cost of accidents by the first method considering the number of worker in construction is based on the compensation paid in case of injury, disability or death. In the second method where the value of projects is considered is based on the cost of accidents in the UK and USA. In the USA and UK, the cost of accidents is high because extensive

investigations and probable legal action follows a serious incident. A more reliable cost of accidents can be based on the number of workers because this method can be based on the actual cost of accidents in different industries in Oman. However, this method must include both the direct and indirect cost of accidents. The quality of life costs which refer to the value attributed to the pain and suffering of victims and their families, need to be considered as well in such estimate (Waehrer et al 2004).

#### **4. Conclusion:**

The statistical data of construction accidents and their associated cost are not available in Oman. The ongoing and planned projects for financial year 2015-2016 in different sectors including construction are discussed to estimate the accidents cost. Two different methods are used by considering the number of workers and the value of projects to estimate the cost of accidents. The importance for improved safety and health status in all sectors is highlighted. Countries such as the UK and USA significantly improved their safety and health performance by establishing an organization responsible for making safety and health regulations, inspection and enforcement. Oman can follow these models for establishing such organizations (regulatory bodies) which not only improve the health and safety status, but will also help the country's economy and could be a source for the generation of revenue as well. Construction organizations need to improve the safety performance for their own benefits as the cost of accident prevention is three times less than the actual cost of accident. Since the costs of accidents in this article are based on the compensation cost (= US\$ 3.74 Million per year) in Oman and on the cost of accidents in construction in the UK/USA (= US\$ 3.237 Billion), therefore further research needs to be conducted to estimate the true cost of accidents in construction considering Oman's

construction industry specific factors and considering the direct and indirect cost of accidents in Oman.

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