

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

Tariq Umar MSc, PhD Scholar, LSBU (UK)  
*College of Engineering, A'Sharqiyah University; Oman*  
*tariqumar1984@gmail.com*

## **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 values. These costs of accidents are although the accumulating huge amount, however construction organizations and the government can play their role in reducing the cost of accidents. Construction organizations need to improve their safety performance and government can establish safety and health regulatory organizations for conducting inspections and enforcement of safety and health law. Such organizations 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. Although there are no construction specific OSH regulations, the review of current OSH regulations, which applies to all industries is given in this article. The availability of construction specific OSH regulations and enforcement will be key to reduce the costs associated with accidents in construction.

## **Keywords**

Health & safety, Management, Safety & hazards, OSH regulations

## **1. Introduction**

Construction is a major industry providing jobs to millions of people and contributing to countries 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 \$ 43160 Million. 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% (644000) of total foreigner population (NCSI, 2015). The total number of work force in the construction industry in Oman is approximately 700 thousand (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. 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 enforce safety and health law. The Health and Safety Executive (HSE) in 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.

### **1.1 Occupational Health and Safety Law in Oman**

Since the 1970s, Oman has been witnessing steady progress in the political and socioeconomic fields. However, the country has had to rely on expatriates to implement its ambitious socio-economic programs of the five year consecutive development plans due to the limited number of qualified Omanis in these areas. Although there are currently no specific regulations which deals only with construction, however based on the stipulation of the Labour Law which entitles the Minister of Manpower to issue regulations, occupational safety and health in all industries have been regulated under the Ministerial Decision (MD No. 286/2008), namely the Regulation of Occupational Safety and Health (OSH) for Establishments Governed by the Labour Law. This Regulation is regarded as the framework legislation in OSH at the level of the Sultanate. It supersedes the earlier Occupational Health and Industrial Safety Precautions, which address general provisions regarding safety at work and the protection of the health of the workers in private-sector establishments. The new OSH regulations consist of four different chapters and 43 articles. Chapter one and chapter two are related to the definition and general provision of the regulations, while chapter three described the medical care requirements and Specifications of work uniform and Personal Protection Equipment. Chapter four deals with the protection of disable worker rights and describe precautions against hazards.

Article 10 of the OSH regulations describes that If an employer employs ten or more workers, he shall set up an OSH programme adequate to the nature and size of the establishment. This programme shall incorporate the following:

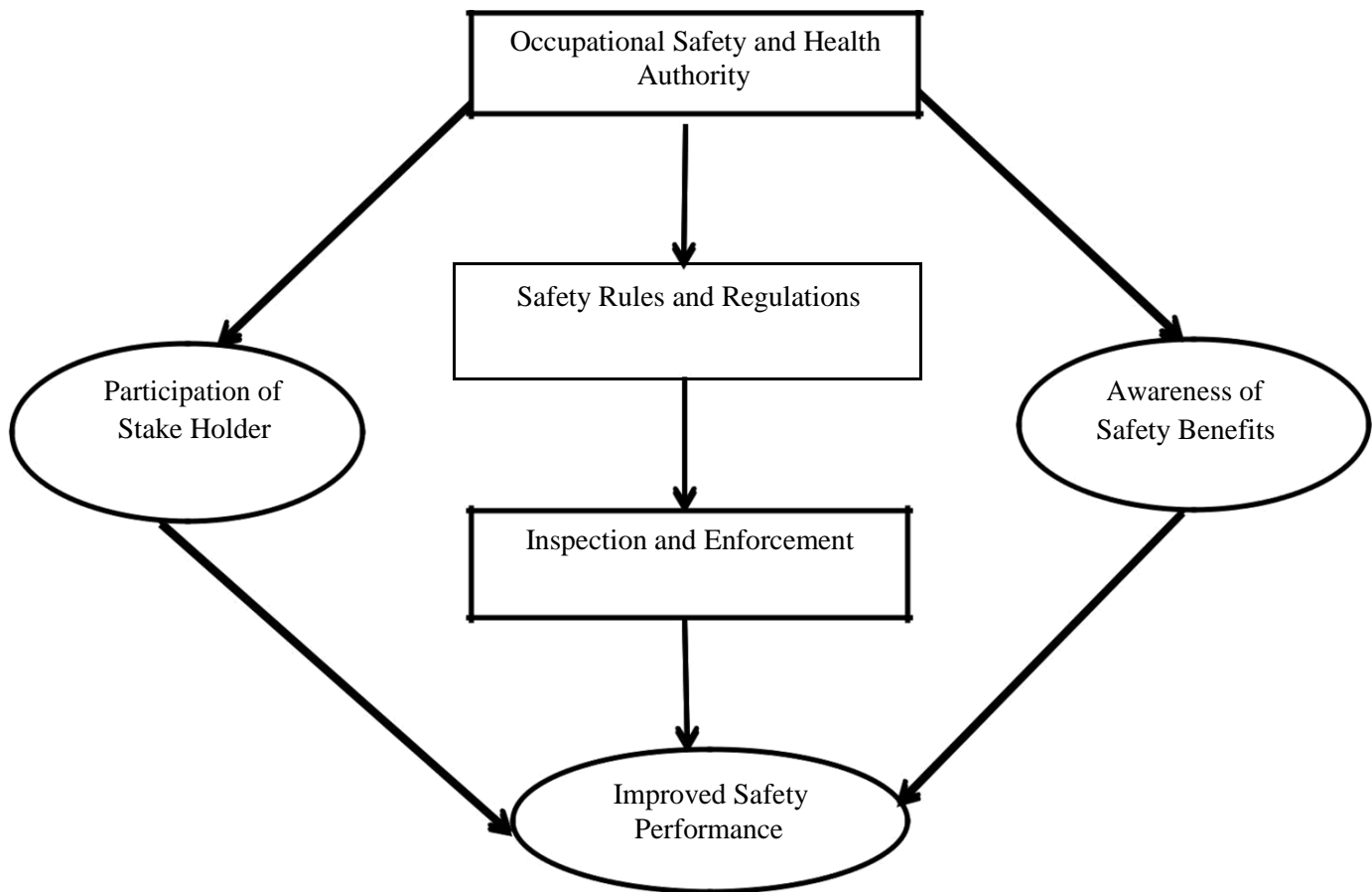
- The policy and goals of the OSH in the establishment.
- The duties and commitments of the employer and the worker.
- The organization and management of the OSH.
- The specified authorities and responsibilities of the establishment's management who are Hauthorized to develop and implement the OSH policies and goals.
- The specific work hazards that result from work, the methods of their assessment and the mechanisms for analyzing them.
- The specified protective arrangements, the emergency plans.
- Specify training programmes on the OSH procedures.
- Identify specifications regarding the purchase or rent of OSH equipment for work.
- The mechanism for monitoring the performance of OSH in the activities of the contractors working with the establishment.
- A timetable for testing the equipment or materials that may expose workers to hazards.
- A timetable for conducting medical examinations for workers.
- Investigation into the work accidents and taking the necessary actions to prevent the repetition of such accidents.
- The procedures that have to be carried out by workers in cases of serious hazards.

- The procedures that have to be carried out by the workers who are exposed to occupational hazards before leaving the work site.
- Prohibitions related to the accident site.
- Method of submitting or receiving workers' complaints regarding work hazards and the means of handling them.

Article 11 of the above regulations states that The employer who employs fifty or more workers shall assign a qualified supervisor to handle the OSH tasks. This supervisor shall directly report to the employer or his representative, and shall set up a plan for OSH, the periodical inspections of all work sites, conducting assessment, protective measures against hazards of work environment using adequate equipment, register the results in a special record, check accidents and work injuries, occupational diseases and investigate their reasons, if any. He shall prepare, reports on them, including the ways and precautions that will prevent their recurrence. He shall follow up the provision of first aid materials and basic health care for workers, including taking the injured to medical centers or hospitals if required. He shall also take part with the professionals in setting up training programmes for the workers to protect them against the hazards of the work environment and voice his opinion on the purchase of machinery or materials and shall prepare guiding and warning signboards on all matters related to OSH within the establishment.

In the UK, the construction industry in terms of OSH is regulated by Construction, Design and Management regulations (CDM 2015). The CDM was initially introduced and enforced in 1995 and subsequently amended with a new version in 2007 and the latest one is issued in 2015. Such regulations enforce all the construction particles, including client, designer and contractor to comply with the OSH.

In the USA the Occupational Health and Safety Administration (OSHA) regulations (Standards – 29CRF) deals the construction industry. Statistics indicate that worker deaths in America are down on average, from about 38 worker deaths a day in 1970 to 12 a day in 2014 and Worker injuries and illnesses are down from 10.9 incidents per 100 workers in 1972 to 3.3 per 100 in 2013 Because of these regulations. A model for construction safety improvement proposed by Umar and Wamuzir (2016 a) focuses on the needs of an overseeing body (figure 1) responsible for safety regulations, inspections, enforcement and to promote safety awareness in construction organizations including financial benefits.



**Figure 1. Proposed Safety Improvement Model (Umar and Wamuziri 2016 a)**

## 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 will be 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 it is designed to serve mixed freight and passenger. The map of the proposed Oman rail network is shown in figure 2.

The next two largest projects which were expecting to be awarded in 2015-2016 financial year are having the values of US\$1.7 billion and US\$1.3 billion. The first project is of Oman Oil Refinery and Petroleum Industries Company, "Liwa Steam Cracker and Polyethylene Project" for enhancing both fuel and plastics production. The second project is of Special Economic Zone Authority at Duqm, "Liquid Terminal Project" 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\$ 43160 Million (Deloitte 2015). The value of ongoing and planned projects, including projects in construction sectors for financial year 2015-2016 in Oman are shown in figure 3. These values include the projects which were started earlier (before 2015), but still not yet completed.

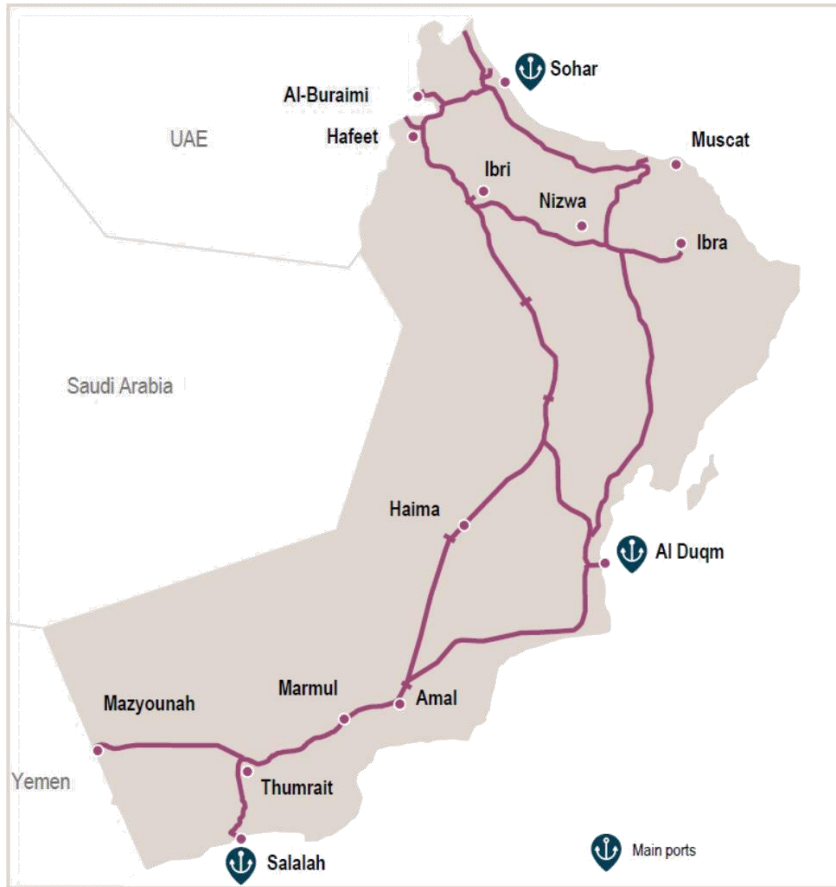


Figure 2: Oman Rail Network (<http://www.omarail.om/brochure.html>)

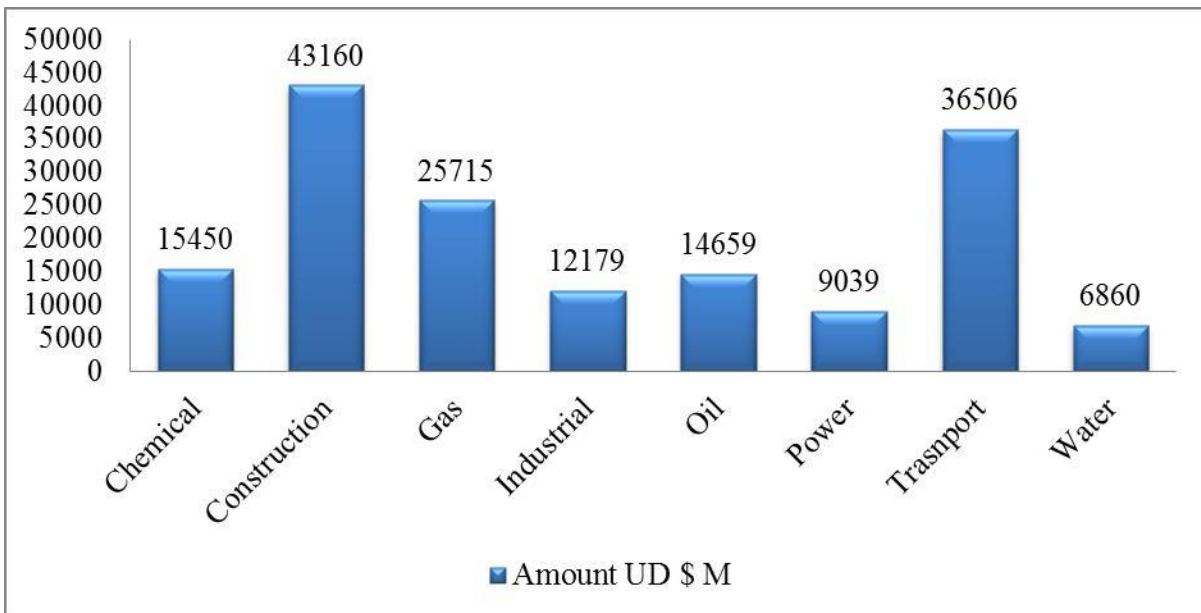


Figure 3: Values of Ongoing and Planned Projects in Different Sectors of Oman (Deloitte 2015)

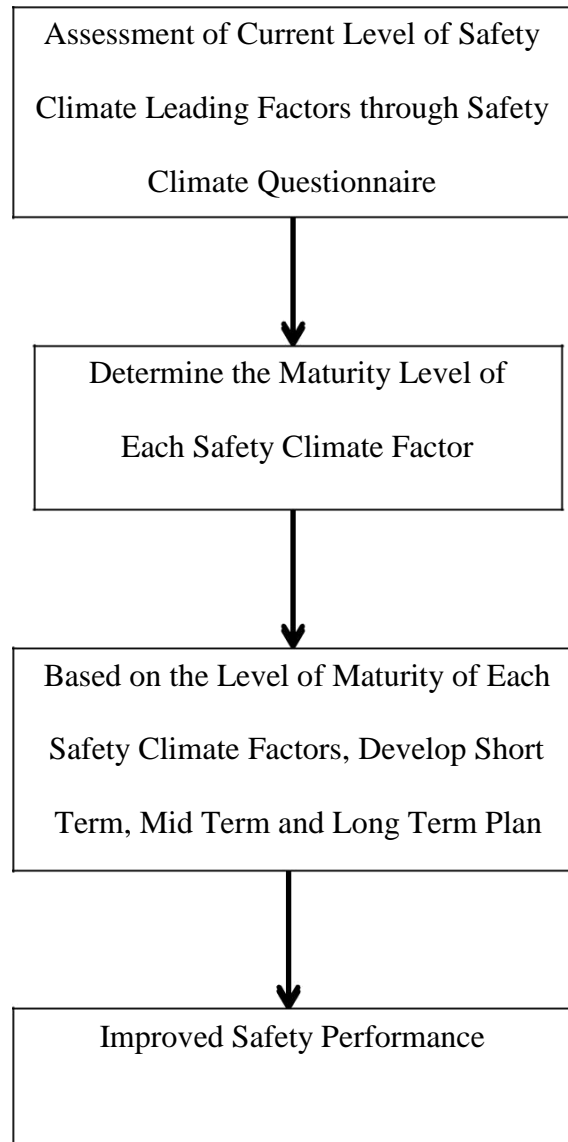
### 3. Construction Safety in Oman

Worldwide occupational injury rates in construction are highest as compared to all 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 International Labour Organization (2015) indicated that at least 108 thousand workers are killed on construction site every year, a figure which represents about 30 percent of all occupational fatal injuries. Data from a number of industrialized countries show that construction workers are 3 to 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 to 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 2014/2015).

A recent research conducted by Umar and Wamuziri (2016 b) focus on the use of safety climate factors for improvement of safety performance in construction in Oman (figure 4). Construction organizations can assess their safety climate factors by using a safety climate questionnaire and can develop plans for improved safety performance. The outcomes of assessing a safety climate can be regarded as the predictors or indicators of safety performance. This can be used by construction organizations to address the weak areas associated with safety climate.

A research conducted in the UK on the ratio analysis of the data on costs and benefits of accidents prevention reveals that when contractors, irrespective of their sizes, spend £ 1.00 on accident prevention, they gain £ 3.00 benefit (Ikpe et., al 2012). 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 (Movement for Innovation, 2003). In the USA, the total cost of accidents constitutes 6.5% of the value of completed construction (The Business Roundtable, 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 this 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 therefore they published in the newspaper, 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. Although, in Oman the true cost of accident associated with the construction industry need to be carefully calculated, however, in this article, a rough cost of construction accidents in Oman is calculated considering two criteria i.e. number of total workers and cost of the projects.



**Figure 4. Process of Using Safety Climate to Improve Safety Performance (Umar and Wamuziri 2016 b)**

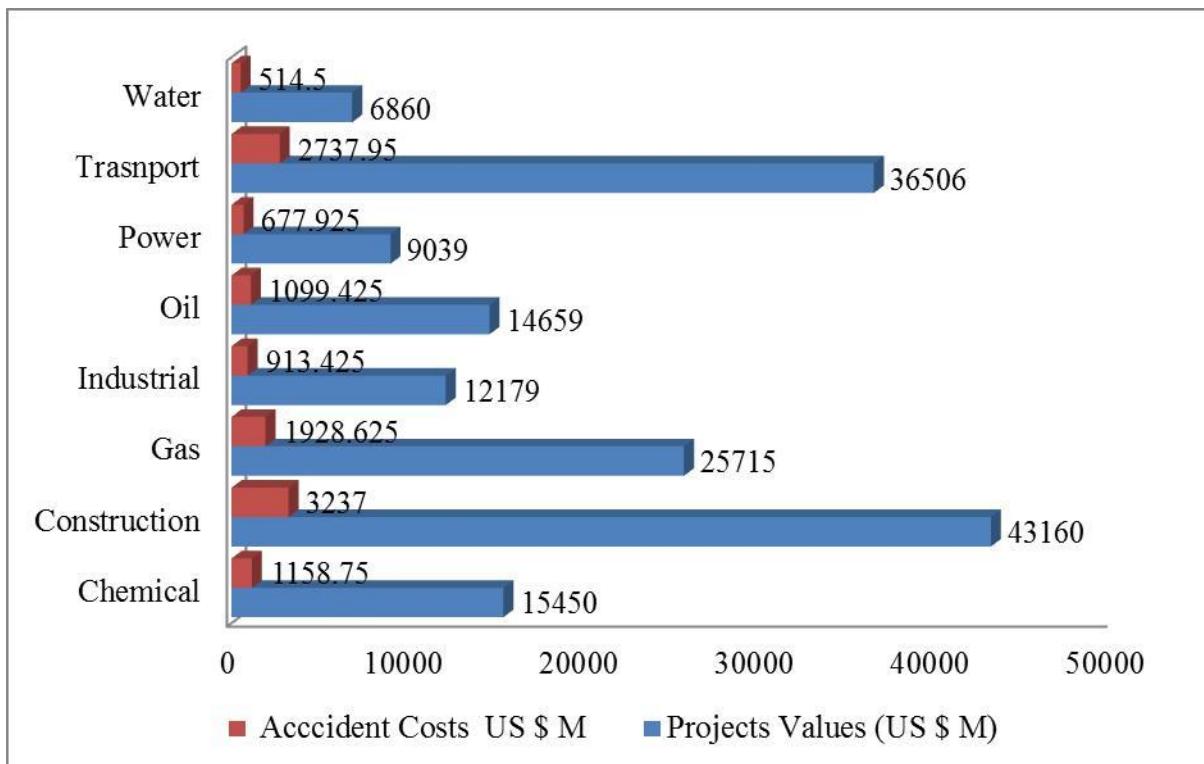
### **3.1 Cost of Accident based on Number of Workers**

The Public Authority of Social insurance in Oman registered Omani nationals' annual report for 2014 shows that 401 cases of work related injuries were disbursed, which cost a total amount of US\$ 1055600 (PASI 2014). The number of active insurees in the Social Insurance System was 197510 in 2014; which means on average the cost of the accident was US\$ 5.35 / insuree/ year. This can be applied to the total number of workers (700000) in the construction industry of Oman to get a rough cost of accident in construction which comes to 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 determined as 6.5% of the total value of completed work and in the UK, it is approximately 8.5% of the tender value (The Business Roundtable, 1995, Anderson, 1997). The cost of accident associated with construction in Oman is determined based on the average of these two values which is 7.5%. ( $6.5\% + 8.5\% = 7.5\%$ ). In Oman the construction projects in 2015, were amounting to a value of US\$ 43160 Million and 7.5% of the amount is US\$ 3237 Million which is cost of accidents in construction. The cost of accident associated with construction and other projects determined based on this principle are shown in figure 5.



**Figure 5. Projects Values in Different Sectors for Year 2015-2016 and Accident Costs in Oman**

### 4. Conclusion

Although statistical data associated with construction accidents and their cost are not available as there is no centralized organization for collecting and monitoring this data. In this article the ongoing and planned projects for financial year 2015-2016 at different sectors including construction are discussed. An estimate of the cost associated with construction is made by two different ways, considering the number of workers and the value of projects to highlight the importance for improved safety and health status, not



only in construction but also in other sectors. 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. The construction specific OSH regulations will be the key to reduce the number of accidents and the costs associated with such accidents. A better mechanism for inspections and enforcements of these regulations across the construction organizations will be further improving the OSH performance in the country. 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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