
Occupational Accidents: A Perspective of Pakistan Construction Industry

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ABSTRACT

It has been observed that construction industry is one of the notorious industry having higher rate of fatalities and injuries. Resulting in higher financial losses and work hour losses, which are normally faced by this industry due to occupational accidents. Construction industry has the highest occupational accidents rate recorded throughout the world after agriculture industry. The construction work site is often a busy place having an incredibly high account of activities taking place, where everyone is moving in frenzy having particular task assigned. In such an environment, occupational accidents do occur. This paper gives information about different types of occupational accidents & their causes in the construction industry of Pakistan. A survey has been carried out to identify the types of occupational accidents often occur at construction site. The impact of each occupational accident has also been identified. The input from the different stakeholders involved on the work site was analyzed using RIW (Relative Importance Weight) method. The findings of this research show that “fall from elevation, electrocution from building power and snake bite” are the frequent occupational accidents occur within the work site where as “fall from elevation, struck by, snake bite and electrocution from faulty tool” are the occupational accident with high impact within the construction industry of Pakistan. The results also shows the final ranking of the accidents based on higher frequency and higher impact. Poor Management, Human Element and Poor Site Condition are found as the root causes leading to such occupational accidents. Hence, this paper identify that “what” type of occupational accidents occur at the work place in construction industry of Pakistan, in order to develop the corrective actions which should be adequate enough to prevent the re-occurrence of such accidents at work site.

Key Words: Construction Industry, Occupational Accidents, Relative Importance Weight.

1. INTRODUCTION

Construction industry plays an important role in the socioeconomic development of any country. The significance and role of this industry has been confirmed by numerous studies [1]. However,

construction industry is one of the hazardous industry because of its high rate of fatalities, injuries, workers compensation cost and loss of work hours [2-4]. It is the second hazardous occupation after agriculture

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industry [5]. This industry recorded highest occupational accidents in the world when compared to other labour intensive industries. It has been observed that construction workers perceive more lack of the job safety. In fact, one of every three work accident takes place in a building site [6]. The workers of this industry are exposed to hazards. There are a number of factors leading hazardous situation at job site, which are quite difficult to quantify for numerous reasons closely associated with the way construction activities are performed. That is why, the occupational accidents data is not at record in various developing countries including Pakistan. The work location of the workers group often changes because each work site evolves as construction proceeds, changing the hazards workers face week by week and sometimes even day to day.

The number of occupational accidents is not easy to quantify as the information on such issues is not available for most of the countries. Nevertheless, ILO (International Labour Office) estimates almost 60000 fatalities takes place at construction sites every year throughout the world. Approximately, at every 10 minutes interval one fatal accident occurs in this industry. It is analyzed that it is about 17% of all fatalities at job site (1 in every six) is construction fatality [8]. As per annual reports of Bureau of Labour Statistics, the fatality rates in the US construction industry per 100,000 workers were recorded as 11.1, 10.9 and 10.5 for the years 2005, 2006, and 2007 respectively. Whereas, in Singapore construction industry fatality rates were recorded as 11.9, 9.4 and 8.1 for the years 2005, 2006, and 2007 respectively [7]. Looking at the occupational accidents trend, it has been observed that Slip, trip, struck by/against objects, fall from height and electrical hazard are the most common types of accidents takes place at work site in this sector. All of these occupational accidents leads to worker injuries and fatalities, which bear high economic cost to companies due to the days off work [8-15].

The construction work site is often a chaotic place with an incredibly high number of actions taking place, where workers and machines are moving in frenzy, with every one focused on task assigned. In such an environment, occupational accidents do take place. The construction site is an extremely busy work environment, so in such conditions, it is responsibility of every one to look out for each other's safety.

This paper identifies that "what" type of accidents often takes place at the work place in construction industry of Pakistan. It also investigates the impact of each identified accident. This study provides a platform to take the corrective actions accordingly because it is quite efficient approach to take the corrective action accordingly as and when, the accidents will be identified. The prevention of such accident is important to save injuries, fatalities, project time and cost in future.

2. RESEARCH SIGNIFICANCE

Studies have found that better the safety at work place in construction industry, the more likely will be the job on time and within budget. However, when an accident occur at work place, resulting to the injury or death of workers eventually an additional time and cost will be required for its compensation. This lost time and cost finally influence the overall project duration and cost.

Some benefits of reduction in accidents are cost saving relative to injuries, health problems and property damage. Improving safety helps to reduce costs, because high rate of accidents and health problems result in higher compensation costs. Savings in overhead costs and productivity can be realized when accidents are prevented. If, there are no interruptions to the work due to accidents, there will be no lost in working days, in this way loss can be minimized. Thus it is essential to identify that "what" type of accidents occurs at the work place in construction industry of Pakistan.

3. RESEARCH METHODOLOGY

Detailed literature review has been carried out to identify different types of occupational accidents usually occur on the construction site. The direct causes, which lead to such accidents were also identified. Later on, the unstructured interviews have been conducted with the different stake holders involved on the construction site and offices to verify the identified accidents and their causes. The experts input were incorporated as suggested. Finally, a set of questionnaire has been designed to get the opinion from the different stakeholders involved on the project site. The respondent was asked to rank the frequency and impact of the accidents using the scale ranging from 1-4 [(1) very low; (2) low; (3) high; and (4) very high. They were also asked to rank the causes of the

accidents using the scale ranging from 1-4 [(1) not significant; (2) slightly significant; (3) significant; and (4) very significant. The input from the experts was analyzed using RIW method.

4. DATA COLLECTION AND ANALYSIS

To meet the objectives of the research two major construction sectors (Building Construction and Highways) were selected to collect the data using the questionnaire. The data were collected from various ongoing building and road projects in the province of Sindh, Pakistan. The cumulative average mean has been calculated using RIW method. The weights were calculated using the Equation (1).

$$RIW = \frac{\sum(a_i x_i)}{\sum X_i}$$

Where a_i = rank of the factor in scale, x_i = variable expressing the frequency of the ranks.

The ranking of the accidents have been done on the bases of the most occurring and the most severe accident. The accident with higher impact and higher frequency of occurrence is ranked as the most important type of accident whereas an accident with lower impact and lower frequency of occurrence is ranked as less important type of accident.

5. RESULTS AND DISCUSSION

For the qualitative studies respondent experience plays a vital role. Hence, it was important during data collection to get the response from the right entity. The data for this research work was collected from variety of experienced stakeholders engaged on the site and offices. Fig. 1 shows the respondent experience.

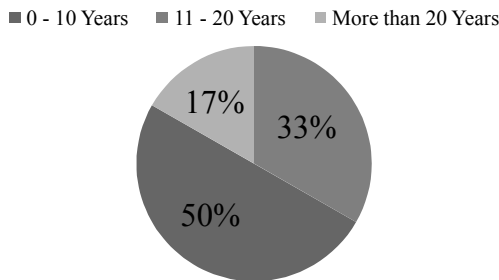


FIG. 1 RESPONDENT EXPERIENCE

5.1 Occupational Accidents in Construction Industry of Pakistan

All the identified accidents are shown in Table 1 in chronological order. Table 1 shows the cumulative average mean values of the impact and the frequency of occurrence of the accidents in construction industry.

The accidents frequency and impact values are plotted to identify the most important type of the accidents. The four categories are shown in the following Fig. 2.

TABLE 1. ACCIDENTS WITH IMPACT AND FREQUENCY VALUES

No.	Type of Accident	Impact of Accident	Frequency of Accident
1.	Burning	2.46	1.55
2.	Caught between	2.53	1.86
3.	Caught in	2.06	1.63
4.	Caught on	2.2	1.7
5.	Electrocution from building power	3.03	2.13
6.	Electrocution from faulty tool	2.8	2.06
7.	Fall at ground level	2.46	1.83
8.	Fall from elevation	3.13	2.33
9.	Others	2.2	1.4
10.	Slip and fall	2.13	2.1
11.	Snake bite	2.83	1.73
12.	Struck against	2.3	1.73
13.	Struck By	2.6	2.2
14.	Trip and fall	1.96	2

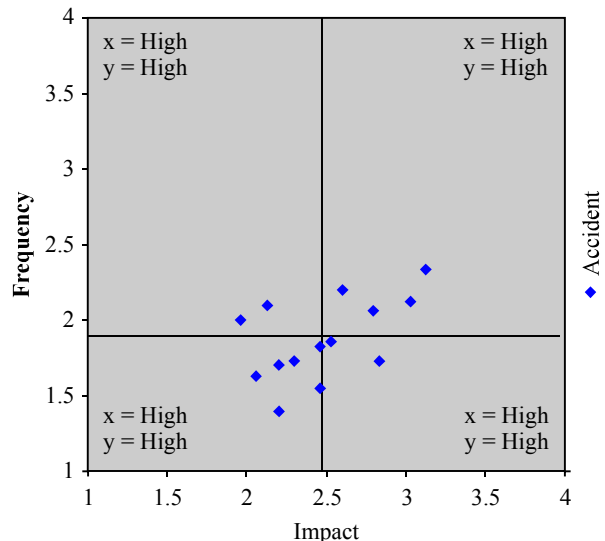


FIG. 2. RANKING ANALYSIS TECHNIQUE FOR THE ACCIDENTS

The accident with higher impact and higher frequency is ranked as the most important type of accident whereas the accident with low impact and low frequency is ranked as least important type of accidents in the construction industry. The complete ranking of the accidents is shown in Table 2.

The result shows that “fall from elevation” is the most important type of accident in this industry followed by Electrocution from building power, Electrocution from faulty tool, Struck by, Snake bite, Caught between, Slip and Fall, Trip and Fall, Fall at ground level and Burning. Whereas Struck against, Caught on and Caught in are the least important type of accidents in the construction industry of Pakistan.

5.2 Root Causes of Occupational Accidents in Construction Industry of Pakistan

The root causes of the accidents were also identified in this study. These were the direct cause leading an accident on project site. These were identified through the literature review. Being the secondary part of the research, a brief rational is given for such causes. The rank of the five roots causes which were identified through the literature review and interviews is shown in the Fig. 3.

TABLE 2. ACCIDENTS OVERALL RANKING

No.	Type of Accident	Rank of Accident
1.	Fall from elevation	1
2.	Electrocution from building power	2
3.	Electrocution from faulty tool	3
4.	Struck By	4
5.	Snake bite	5
6.	Caught between	6
7.	Slip and fall	7
8.	Trip and fall	8
9.	Fall at ground level	9
10.	Burning	10
11.	Struck against	11
12.	Caught on	12
13.	Others	13
14.	Caught in	14

The result shows that Poor Management is the most significant root cause of the occupational accident in this industry followed by Human Element, Poor Site Condition, Nature of Work and Equipment. Today, there is a desperate need in Pakistan's construction industry to reduce the rate of occupational accidents and to improve management procedures and performance, along with the establishment of safety laws and regulations by the government of Pakistan so as such accidents can be prevented.

6. CONCLUSIONS

As, it has been discussed earlier that fall from elevation, electrocution from building power and faulty tool, struck by and snake bite are the important types of accidents found in this study, within the construction industry of Pakistan.

Fall from Elevation: Scaffolders, masons and painters are the most exposed to falls. The nature of work of these tradesmen revolves around poor site management, poor site control and human errors, and thus contributes to this type of accident.

Providing fall protection equipment such as scaffolds, safety nets, mesh, etc. can reduce fall accidents, as can safe practices and procedures. If these actions are not possible then guardrails should be installed around open floors, walls and platforms, or wherever a fall is possible. The rails should be erected and installed by trained and competent workers. All the employees need to be trained to recognize fall hazards and safe working practices before they are allowed to work on foundation walls, roofs, trusses and exterior walls or floor erections and installations.

Electrocution from Building Power and Faulty Tool: Electrical work is complex in nature and even a small mistake can cause a major accident. Electrocution was found to be the second most

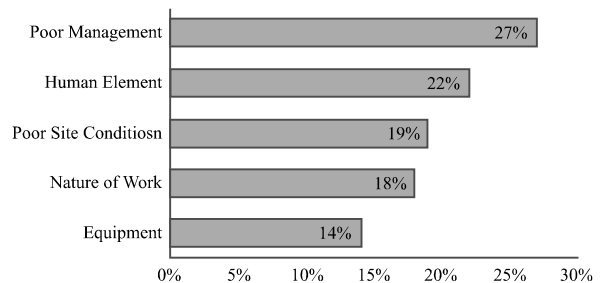


FIG. 3. ROOT CAUSES OF OCCUPATIONAL ACCIDENTS

common type of accident after falls in the construction industry of Pakistan. The main reasons for electrocution are: (1) the poor upkeep of electrical tools; (2) task errors; and (3) poor site condition (caused by weather and poor housekeeping).

To help workers avoid being electrocuted, all employees should be properly trained for this job; wearing the PPE (Personal Protective Equipment) should be compulsory, when working with or around electricity. To achieve this outcome employer should conduct training sessions for employees so that they can learn the proper and safe procedures.

7. FUTURE RECOMMENDATIONS

The occupational accidents & their root causes are identified in the initial phase of the study. Later on, their priority ranks are been investigated in the second phase of study. Studies should be carried out to explore the indirect causes leading to such work related accidents. This study can also be extended for manufacturing industry so as such work related accidents can be prevented on job site in future.

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