

# Occupational Accidents in Construction Works - Causes and Suggestions for Prevention

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**Abstract:** *Construction is one of the leading sectors in occupational accidents. In this study occupational accidents in construction sector, their causes and suggestions for prevention are discussed. Five different occupational groups working in construction area including labour-skilled labour, technical staff, occupational safety staff, building inspection staff and senior executives were investigated for their opinions on occupational health and safety applications in Turkey. In the survey study, the causes of occupational accidents and the suggestions for prevention were evaluated using the data obtained by a questionnaire survey applied to a total number of four hundred and eighty workers from all of the above-mentioned groups.*

**Keywords:** Occupational health and safety, construction sector, occupational accident

## 1. Introduction

It is very difficult to fulfill occupational safety requirements in construction sector due to the fact that different teams come together for a specific project and separate from each other at the end of the project. Relationships are project based, staff turnover is very high and risks related to work are constantly changing because of the constant change of organizational structure. In order to ensure occupational safety in construction works, types of occupational accidents and the factors that cause these accidents should be determined first. Prevention of accidents and safety assurance can then be achieved by taking these into consideration.

## 2. Previous Studies

### 2.1. Types of Occupational Accidents

When studies on the types of occupational accidents are examined, the most common types of accidents in construction industry are determined to be 'falling from height' [1-13]. According to the literature findings, other common types of occupational accidents are; 'being struck by an object' [1,4,7,8,9,10,11,12,13], 'electric shock' [4,7,10,11,12], 'accidents caused by construction machines and engineering vehicles' [7,9,10,11] and 'being stabbed by an object, being cut by an object' [4,9,11].

### 2.2. Causes of Occupational Accidents

According to literature findings, causes of occupational accidents are generally 'lack of occupational safety training' [13,15,16,17,19,20] and 'unsafe work environment' [14,2,17,18,20]. Other causes are 'management policy of the company' [15], failure in implementing the occupational safety system' [16] and 'the lack of occupational safety specialist' [17].

### 2.3. Order of Priority While Working

Order of priority while working in construction companies is determined as: Quality, cost, time, occupational safety; and in government agencies: cost, quality, time, occupational safety [21]. Occupational safety is the last priority for the companies.

### 2.4. Implementations to Ensure that Employees Comply with the Occupational Safety

Literature suggests that the most effective way to ensure that the employees in construction works comply with the occupational safety regulations is to provide occupational safety training to employees [6,16,22,24,25,26,27,28,29,31]. Other effective methods are seen as the establishment and implementation of the occupational safety system [16,22,24,31] and active control [1,25,32].

While there are many studies on types of construction accidents, their causes and the solution suggestions; this study focuses on differences of approaches, practices and expectations of and the differences between five different groups of workers in construction industry. The solution suggestions for ensuring occupational safety are also discussed by considering the data/information obtained by a questionnaire survey.

## 3. Material and Method

People working in construction in Turkey were divided into five different occupational groups including labour-skilled labour, technical staff, occupational safety staff, building inspection staff and senior executives. Considering the findings of previous studies, a questionnaire survey was conducted in order to determine the opinions of the employees in construction works related to occupational safety implementations. Survey questions were prepared for each group separately and questionnaires were distributed

throughout Turkey. Survey findings were evaluated together with literature review findings.

## 4. Findings and Discussion

### 4.1 Profile of Participants

The distribution of participants according to task groups they undertake in construction works is shown in Table 1. According to the table a total of 480 workers including 234 (48,95%) from labour-skilled labour group, 99 (20,71%) from technical staff, 30 (6,28%) from occupational safety staff, 69 (14,02%) from building inspection staff and 48 (10,04%) from senior executives.

**Table 1:** Distribution of Survey Groups

Seq. No	Survey Groups	Number of Participants	Rate (%)
1	Labour-Skilled Labour	234	48,75
2	Technical Staff	99	20,63
3	Occupational Safety Staff	30	6,25
4	Building Inspection Staff	69	14,38
5	Senior Executive - Employer	48	10,00
	<b>TOTAL</b>	<b>480</b>	<b>100,00</b>

### 4.2 Number and Types of Occupational Accidents Encountered

When the number of occupational accidents encountered and/or witnessed by the participants of the survey are examined by groups, it is determined that 57,26% of the employees including 35,71% of the occupational safety staff group and 60,42% to 65,22% of the other groups have not encountered and/or witnessed any occupational accidents (Table 2). And the most common types of occupational accidents are falling, being pricked by an object, being cut by an object, being crushed by an object and being struck by a falling object (Table 3).

### 4.3 Causes of Occupational Accidents

The opinions of the participants on the main causes of occupational accidents are given in Table 4. Lack of training comes to the forefront at the rate of 79,95%. After training, lack of control is seen as the main cause at the rate of 68,07% and the unsafe working conditions at the rate of 53,77% (Table 4).

**Table 2:** Number of Occupational Accidents Encountered/Witnessed by Employees

Sequence No	Number of Occupational Accidents Encountered/Witnessed	Labour-Skilled Labour (%)	Technical Staff (%)	Occupational Safety Staff (%)	Building Inspection staff (%)	Senior Executive (%)	General Average (%)
1	0	64,35	60,61	35,71	65,22	60,42	57,26
2	1	20,00	12,12	17,86	13,04	14,58	15,52
3	2	8,70	13,13	10,71	8,70	12,50	10,75
4	3	2,17	5,05	3,57	7,25	2,08	4,03
5	4	2,17	0,00	14,29	-	2,08	3,71
6	5	1,30	3,03	10,71	4,35	-	3,88
7	6	0,00	1,01	0,00	-	2,08	0,62
8	7	0,00	0,00	3,57	0,00	-	0,71
9	8 and above	1,30	5,05	3,57	1,45	6,25	3,53

**Table 3:** Types of Occupational Accidents Encountered/Witnessed by Employees

Sequence No	Type of Occupational Accidents Encountered/Witnessed	Labour-Skilled Labour (%)	Technical Staff (%)	Occupational Safety Staff (%)	Building Inspection staff (%)	Senior Executive (%)	General Average (%)
1	Falling	19,83	26,26	43,33	32,61	27,08	29,82
2	Being Pricked by an Object	13,22	19,19	33,33	19,57	18,75	20,81
3	Being Cut by an Object	20,66	15,15	36,67	10,87	14,58	19,59
4	Being Crushed by an Object	13,22	6,06	36,67	8,70	6,25	14,18
5	Being Struck by a Falling Object	14,88	11,11	16,67	6,52	12,50	12,34
6	Vehicle Accident	6,61	3,03	10,00	8,70	6,25	6,92
7	Caused by Machines	9,92	13,13	13,33	8,70	14,58	11,93
8	Electric Shock	0,83	1,01	0,00	4,35	0,00	1,24
9	Fire	0,83	0,00	0,00	0,00	0,00	0,17

**Table 4:** Main Causes of Occupational Accidents According to Employees

Sequence No	Main Cause of Occupational Accidents According to Employees	Labour-Skilled Labour (%)	Technical Staff (%)	Occupational Safety Staff (%)	Building Inspection staff (%)	Senior Executive (%)	General Average (%)
1	Lack of Training	74,43	83,84	90,01	71,01	80,44	79,95
2	Lack of Control	48,45	71,72	80,00	59,73	80,44	68,07
3	Unsafe Working Conditions	40,37	59,60	66,67	43,49	58,70	53,77
4	Fate	22,91	-	-	-	2,17	5,02

#### 4.4 Priorities While Working

The order of employees' priorities while working is determined as finishing the work; accident free 79,83%, accurately 74,09%, in time 58,61% and economically 51,09% (Table 5).

#### 4.5 Implementations that Ensure Compliance with Occupational Safety Regulations

Inspection, with the rate of 61, 84%, is stated to be the most effective implementation for ensuring compliance with occupational safety regulations. Occupational safety training at the rate of 61,84% and education at the rate of 58,68% follow inspection. It is seen that the wage and time given to the employee are not effective in ensuring compliance with occupational safety regulations (Table 6).

### 5. Conclusion and Suggestions

In this study, the types and causes of occupational accidents that took place in the construction works and requirements for ensuring the occupational safety are tried to be determined directly from the point of view of employees in construction sector in order to minimize occupational accidents and minimize losses that may occur as a result of the accidents. For that purpose, a survey was conducted to the employees of five different occupational groups in the sector, including labour-skilled labour, technical staff, occupational safety staff, building inspection staff and senior executives. Findings both from previous studies and survey

are summarized below.

The most common type of the occupational accident encountered both in the literature and during the questionnaire survey is falling from height. Other types of occupational accidents that employees encounter are related to objects and listed as being pricked by an object, being cut by an object, being crushed by an object and being struck by a falling object. About half of the employees has encountered at least one occupational accident.

Literature findings showed that project based production causing problems related with safety training, safe working conditions and inspection is the most important reason for occupational accidents in construction industry. Questionnaire survey findings also supported this fact by showing that employees found training and lack of inspection to be the most important reasons of construction accidents.

While literature showed that occupational safety is the last priority of construction companies, survey findings displayed that it is the first priority for employees.

According to both the literature and the survey findings, the most effective implementation to ensure occupational safety is occupational safety training. Establishment and implementation of an occupational safety system and active occupational safety inspection are seen as other effective methods.

**Table 5: Priorities While Working**

Sequence No	Priorities While Working	Labour-Skilled Labour (%)	Technical Staff (%)	Occupational Safety Staff (%)	Building Inspection staff (%)	Senior Executive (%)	General Average (%)
1	Accident Free	79,07	79,80	93,33	59,69	87,24	79,83
2	Accurately	62,33	78,78	66,67	77,61	85,07	74,09
3	in Time	40,49	63,63	63,33	44,77	80,85	58,61
4	Economically	29,33	61,61	59,99	34,32	70,21	51,09

**Table 6: Implementations to Ensure Compliance with Occupational Safety Regulations**

Sequence No	Implementation that Ensures Compliance with Occupational Safety Regulations	Labour-Skilled Labour (%)	Technical Staff (%)	Occupational Safety Staff (%)	Building Inspection staff (%)	Senior Executive (%)	General Average (%)
1	Inspection	57,96	66,33	70,37	58,82	70,83	64,86
2	OHS Training	50,00	61,22	77,78	51,47	68,75	61,84
3	Education	56,64	61,22	55,56	47,06	72,92	58,68
4	Punishment	10,62	44,90	22,22	33,82	37,50	29,81
5	Firing the employees	13,72	28,57	14,81	17,65	37,50	22,45
6	Wage	11,06	2,04	18,52	8,82	25,00	13,09
7	Time	9,73	5,10	18,52	1,47	12,50	9,47
8	None of Them	0,44	-	-	-	-	0,09

#### 5.1. Suggestions

By considering the current research findings, occupational safety can be ensured and occupational accidents can be prevented by ;

- Giving proper occupational safety training to every

employee on site in accordance with the risk assessment of the project and legal legislations.

- Ensuring a safe working environment in accordance with the risk assessment of the project and ensuring safety of each employee by providing appropriate personal protective equipment.
- Keeping records related with the experiences of the

companies related to occupational accidents, additional precautions must be taken for the environment safety according to the evaluation results of these experiences, and the employees should be provided additional occupational safety trainings appropriate to the occupational accident types.

- Performing active occupational safety inspection on site.

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