CONSTRUCTION SAFETY AND HEALTH REGULATIONS AND MEASUREMENTS IN TURKISH REPUBLIC OF NORTHERN CYPRUS DURING YEARS (2010-2014)

A THESIS SUBMITTED TO THE GRADUATE
SCHOOL OF APPLIED SCIENCES
OF
NEAR EAST UNIVERSITY

BY

PSHTIWAN SALEEM AHMED

In Partial Fulfillment of the Requirements for
the Degree of Master of Science
in
Civil Engineering

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Approval of the Graduate School of Applied Sciences

Prof. Dr. İlkay Salihoğlu
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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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All praise is for Allah, the exalted. With high gratitude to Him who gave me the ideas and physical strength in preparing this thesis. Completion of thesis of this nature requires more than just the efforts of the author.

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ABSTRACT

This study investigated the concepts of construction safety Regulations and measurements in TRNC, as well as its differences with the concepts of construction safety Regulations and measurements in Turkish Republic and European Union.

The success of any construction project is highly depending on health and safety management and its objective is to obtain a clear and successful work on the construction sites without fatalities or injures among the workers and other administrators on the construction site. The fatalities or injuries among human resources on construction sites will lead to various types of negative effects, Therefore, it is important to have an investigation and develop health and safety plan program in order to reduce the injuries and fatalities by training the new generation of engineers or workers on construction sites, and reach a general health and safety plan for the most critical activities of construction projects.

The aim of this study is to identify the situation of construction safety, and evaluating the work accidents and fatalities in the construction industry in North Cyprus, as well as to understand the safety construction regulations and the role of the safety in the real life.

Occupational accidents lead to important socioeconomic loses in both developed and developing countries all over the world, including TRNC, Turkey and European Union. However, in recent years, the number of occupational accidents in developed European Union countries has decreased as the result of effective precautionary measures.

Keywords: Construction project management, Occupational accidents, Construction safety regulations

ÖZET

Bu çalışma KKTC'de inşaat Güvenlik Yönetmeliği ve Ölçümler kavramlarını yanı sıra Türkiye Cumhuriyeti ve Avrupa Birliği Yapı Güvenliği Yönetmeliği kavram ve ölçümleri ile farklılıklarını araştırmaktadır.

Herhangi bir inşaat projesinin başarısı büyük ölçüde sağlık ve güvenlik yönetimine bağlıdır. Hedefi şantiyede işçiler ve diğer yöneticler arasında ölümler veya şantiyelerde insan kaynakları arasındaki yaralanmalar olmadan temiz ve başarılı bir iş yapmaktır. Şantiyelerde ölümler veya çalışanlar arasında vukubulacak yaralanmalar olumsuz etkilere yol açacaktır. Bu nedenle araştırma yapmak ve yeni kuşak mühendisleri ve çalışanları şantiyede eğiterek sağlık ve güvenlik planı program yapmak ve inşaat yapım projelerinde en kritik işler için genel bir sağlık ve güvenlik planı düzenlemek çok önemlidir.

Bu çalışmanın amacı, yapı güvenliği durumunu belirlemek ve Kuzey Kıbrıs'ta inşaat sektöründe iş kazaları ve ölümlerin değerlendirilmesini yapmanın yanı sıra, güvenli inşaatın yönetmeliği ile gerçek hayatta güvenliğin rolünü anlamak içindir.

Bütün dünyadaki gelişmiş ve gelişmemiş ülkelerde KKTC, Türkiye ve Avrupa Birliği de dahil olmak üzere iş kazaları önemli sosyo-ekonomik kayıplara yol açmaktadır.Ancak, son yıllarda, etkili ihtiyati tedbirlerin alınması sonucunda gelişmiş Avrupa Birliği ülkelerinde iş kazalarının sayısı azalmıştır.

Anahtar Kelimeler: İnşaat proje yönetimi, İş kazaları, Yapı güvenliği yönetmeliğ

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LIST OF ABBREVIATIONS

CDM:	Construction (Design and Management) Regulations
EU:	European Union
EASHW:	European Agency for Safety and Health at Work
HASAWA:	Health And Safety At Work Act
HSC:	Health and Safety Commission
HSE:	Health and Safety Executive
ILO:	International Labor Office
MHSW:	Management of Health and Safety at Work Regulations
MoLLS:	Ministry of Labor and Social Security
NSC:	National Safety Council
OSHA:	Occupational Safety and Health Administration (United States)
OSH:	occupational Safety and Health
PPE:	Personal Protective Equipment
SMEs:	small and medium-sized enterprises
TRNC:	Turkish Republic Northern Cyprus
UK:	United Kingdom
UNEP:	United Nations Environment Program
USA:	United States American
WHO:	World Health Organization

CHAPTER 1

INTRODUCTION

Occupational safety and health have an effect on all aspects of work. In a low risk organization, safety may be supervised by a single competent manager. In a high risk manufacturing plant, many different specialists, like engineers (civil, mechanical and electrical), medical doctors and nurses, lawyers, trainers, work planners and super-visors, may be required to assist the expert safety practitioner in ensuring that there are acceptable safety standards within the association (Hughes and Ferrett, 2007).

There are many difficulties to getting good standards. Typical examples of such obstacles are the pressure of manufacture or performance targets, financial constraints and the difficulty of the organization. However, there are some powerful incentives for organizations to attempt for high safety standards. These incentives are legal, moral and economic. Company responsibility, an expression used widely in the 21st century world of work, covers a wide range of issues. It includes the effects that an organization's business has on the environment, human rights and third world poverty. Safety in the workplace is an important corporate responsibility issue. Occupational safety and health (OSH) is a very important issue that should be considered in every workplace, OSH rules and regulations should be followed for preventing injuries (Hughes and Ferrett, 2007).

Occupational health and safety is a regulation with a wide scope involving many specialized fields. In its broadest sense, it should intend at:

- the maintenance and encouragement of the highest degree of physical, mental and social well-being of workers in all occupations;

- The elimination of working conditions that may adversely affect the safety and health of employees.

Successful occupational health and safety practice requires the partnership and contribution of both workers and employers in health and safety programs, and includes the consideration of issues involving to occupational engineering safety, medicine, industrial hygiene, psychology, toxicology, ergonomics and education (Hughes and Ferrett, 2011).

Occupational health and safety is important because, work acting a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is on a plantation, in an office, factory, etc. Therefore, work environments should be safe and healthy. for many workers , this is not the case yet. All over the world, every day workers are faced with a huge number of safety and health hazards, such as: exposure to excessive dusts, gases, noise, vibration and severe temperatures (Hughes and Ferrett, 2011).

Unfortunately some employers suppose little duty for the protection of workers' health and safety. Actuality, some employers do not even know that they have the moral and often legal duties to protect workers. Work accidents includes injuries and fatalities are became a common accident in all over the word due to the result of hazards and lack of attention given to health and safety (Hughes and Ferrett, 2011).

1.1 Importance of this Research, General Objectives

The importance of this study is to investigate and evaluate the factors which affect on the construction safety. The major significant points from the institutions view are the cost, time, and quality, the governmental organization needs to be sure that the projects start and finish throughout the entire amount of money and the sufficient time to achieve the project objectives within the quality standards considering the construction safety regulations.

The purpose of this study is to understand the safety construction regulations and the role of the safety in the real life. The ultimate objective of the safety at work (construction) regulations is to provide legislative backup in order to help prevent occupational injuries and fatalities in the construction. In addition the direct objectives of the Regulations are to introduce a clear framework of responsibilities during the construction industry to ensure that the health and safety of employees are protected in the construction industry.

1.2 Research Question

This research tries to answer the following questions regarding to construction safety regulations and measurements:

- What is the term of construction Safety?
- What are the regulations of construction Safety?
- What is the role of the construction Safety to minimizing or preventing injuries and fatalities in the construction of the real life?
- What are the effects of safety on the construction projects (considering time, cost, and quality)?

1.3 Hypothesis

This study investigates the construction safety in Turkish Republic of Northern Cyprus, as well as collecting data about injuries and a fatality occurred in construction industry and declares the main concepts of construction safety regulations and measurements in the world considering these countries (TRNC, Republic of Turkey, EU).

This research investigates the significance of safety regulations and their role in the minimizing or preventing injuries and fatalities in the construction. According to the flexibility of construction project and the dynamic nature of risks, many variables will excite and easily influence on the construction activities that lead to extra budget and delay in a construction.

1.4 Methodology

- A review of the literature to determine what is known and determines current practice of the construction safety regulations in the construction industry.
- Visiting "Ministry of labor and social security" and collecting statistical accident works in Turkish Republic of Northern Cyprus.
- Explanation of construction safety regulations and measurements in the world, as well as collecting data about injuries and fatalities occurred during all stages of construction.

- Explanation of construction safety in Turkish Republic of Northern Cyprus during Years 2010-2014, as well as collecting data about injuries and fatalities occurred in the construction industry.
- Declaration and investigating the main concepts of construction safety regulations and measurements in the world leading countries (TRNC, Republic of Turkey, and EU).
- Declaration the main differences between the Concepts of the Construction Safety Regulations and Measurements of TRNC, Republic of Turkey, and EU.

1.5 Theoretical Approach

The health and safety plan is the instrument that facilitates the exchange and communication of safety and health issues between all participants in the construction process. During the preconstruction phase the plan is prepared using information from the client, designers, and planning supervisor. Prior to commencement of the project works, the plan is further developed by the principal contractor to include details of safety and health risk management and prevention which arise due to the construction activities of contractors and sub-contractors. The safety plan is subject to continuous review and amendment as construction progresses, this research is investigating the significant of safety regulations and its role in the minimizing or preventing injuries and fatalities in the construction. According to the flexibility of construction project and the dynamic nature of risks, many variables will excite and easily influence on the construction activities that lead to extra budget and delay in a construction.

1.6 Literature Review

In the recent years several researches have been conducted in the field of construction management commonly such as Health and Safety Management on Construction Sites, an integrated approach to multi-stakeholder interventions in construction health and safety improving safety performance in construction and so on but there is no research such as a title of this study.

Data and information of this study sourced from various international sources included conference papers, articles, reports, books, and journals, other thesis, and the Internet.

The literature review examines what has been said about the research subject. This assists the researcher in identifying any gaps that need to be filled through further research. All agree that differing environments, legal frameworks, cultures and attitudes play a major role in the H&S performance in the construction industry, and Training, in this regard, will develop the workers' skills. Moreover, a system of work that is healthy and safe should be developed and the unsafe practices should be corrected or reported.

1.7 Structure of Chapters

The Structure of Chapters consists of seven chapters, as following:

Chapter 1: This chapter covers the briefly introduction, importance of the research as well as general objective of this research, research questions, Hypothesis, a briefly background about methodology and literature review and theoretical approach.

Chapter 2: This chapter consist the literature review about the Construction Safety and health and explaining some concepts as well as some terms of Construction Safety and health.

Chapter 3: This chapter includes historical and background of the Construction Safety Regulations and Measurements in general.

Chapter 4: The contents of this chapter are the Construction Safety Regulations in the world's leading countries European Union, USA, and Turkey.

Chapter 5: This chapter covers the Main Concepts of the Construction Safety Regulations and Measurements in TRNC, Republic of Turkey, and European Union.

Chapter 6: This chapter consist the Main differences in between the Concepts of the Construction Safety Regulations and Measurements of TRNC, Republic of Turkey, and EU.

Chapter 7: In this chapter presents its Conclusion and Recommendation.

CHAPTER 2

LITERATURE REVIEW

Health and safety issues have a strong influence on different areas of life such as business, daily occupations and economic activity. Health and safety issues also play a crucial role in industry, the conduct of companies, institutes of education, places of entertainment and offices (Eurostat, 2010).

The issue of health and safety is of great importance because it resembles a problem in the field of construction. Matters of health and safety may be considered as issues that concern humans, the environment and the economy. This is because they are intimately connected to the welfare of people and the environment in general. Health and Safety matters spread across all questions of industrial progress and the standards and regulations that determine and govern advances made in that field (Eurostat, 2010).

However, although questions of health and safety are primarily matters of human or environmental consequence they have a broader and more negative impact on the economy of any single country as a whole. The initial costs of accidents and illnesses represent a relatively small part of the more general damage done as there are other larger and greater consequences (Hughes, 2009).

The Agency of European for Safety and Health at Work has confirmed that hundreds of workers have been killed and thousands of accidents have taken place in 3 days of absence from work site. The loss of these working days has resulted in massive harm being done to the European economy as a whole. This loss of working days yearly affects the economy of Europe in general (OSHA, 2010).

According to the Turkish Social Insurance Agency (Sosyal Sigortalar Kurumu (SSK), the annual loss of working days due to illnesses or accidents at work was calculated at 2 million through the years 1997-2006 (OSHA, 2010). The result of this loss is about 36 million Turkish Lira (about 25 million US dollars), according to the Turkish Ministry of Labor and Social Security (Çalışma ve Sosyal Güvenlik Bakanlığı) (Çelikağ, 2008). The ministry also claimed that 3,000 days were

lost in Northern Cyprus during the same time period while 103 days were irretrievably lost due to accidents or illnesses at worksites in the Republic of Cyprus (Stavrou, 2010).

2.1 The Meaning of Health and Safety in General

The two words health and safety are often paired together when considering working practices in the workplace. The words complement each other in significant ways and it would be difficult to contemplate or examine the meaning of one word without doing the same for the other. However, to define more clearly and provide a better of picture of what is under review here it is best examine the precise meaning of these words when related to the working environment.

Concerning safety, HSE (2009) gives the definition of safety as the absence of danger. EASHW (2004) suggests the following meaning, protection state. Also Phil Hughes (1999) gives the idea that no risk is involved in a specific work. In this sense, it is not possible to eliminate completely a risk factor and so there is no such thing as absolute safety, that no situation in the workplace can be utterly risk-free (HSE, 2009).

Health is a necessary part and a corollary to the notion of safety, especially when it refers to conditions in the working lives of people. For example, there are references in the literature to the idea of being well or being in a state of wellness in a general sense. Being healthy therefore is paramount when we apply the term to the work setting. A healthy workforce is an essential element in any working situation (EASHW, 2004; HSE, 2009).

Hence, health and safety management at a workplace should be done together and at the same time. In the same sense, it can refer to the management of the environment in collaboration with the work place. More recently, as is known, environmental issues are in need of management and control. To properly supervise and oversee the construction site and the environment generally, it needs to employ the same codes, practices and procedures (EASHW, 2004; HSE, 2009).

2.1.1 Health and Safety Basic Terms

Safety is related to external threats, and the perception of being sheltered from threats. According to the business Dictionary, safety is defined as a relative freedom from danger, risk, or threat of

harm, injury, or loss of personnel and/or property, whether caused deliberately or by accidents (Hughes and Ferrett, 2007).

Safety can also be defined as the control of recognized hazards to achieve an acceptable level of risk. In this study, safety means freedom from danger, harm, and injury to the person involved in construction activities (Hughes and Ferrett, 2007).

In order to understand the criteria of this thesis, there are some basic terms that require definition and elucidation:

- **Accident**

  The word refers to any event and the consequences of that event in relation to health and safety on a construction site. An accident in this context is therefore an undesired event with undesired results that can be physical, environmental or both (Hughes and Ferrett, 2007).

- **Hazard**

  The word refers to the ability of something in to cause harm or be a threat to life, health, property or the environment. Hazards can sometimes be the outcome of the interaction of components as in the chemical filed (Hughes and Ferrett, 2007).

- **Injury**

  The word refers to the physical consequence of an accident or incident. Here, it can be noted in the construction industry, hundreds of incidents take place at workplaces causing injuries (Hughes and Ferrett, 2007).

- **Risk**

  The word risk means the chance or likelihood of loss or gain resulting from the taking of that risk (Hughes and Ferrett, 2007).

  Cascio (1986) defines hazardous events as 'aspects of harm in the environment of work such as working at a height, working on a roof, working on scaffolding, formwork

excavation, and electrical work. Such hazards have the potential for immediate harm. Another other kind of harm might affect the health of the employee slowly and over a lengthy period of time and sometimes in an irreversible way such as in diseases of the respiratory system, cancer and so on. Also, Cole (2002) has referred to the conditions of work that can be considered as typical environments of hazards (Cole, 2002).

- **Near miss**

A near miss is an unplanned event that did not result in injury, illness, or damage – but had the potential to do so. Only a fortunate break in the chain of events prevented an injury, fatality or damage; in other words, a miss that was nonetheless very near. Many organizations wait for losses to occur before taking steps to prevent a recurrence. Near miss incidents often precede loss producing events but are largely ignored because nothing (no injury, damage or loss) happened. Companies who excel at safety and have close to zero incidents utilize near-miss reporting in various ways, whether as a leading indicator of safety performance, a component of a hazard identification system, or as a mechanism for engaging and empowering employees at different levels throughout an organization (Hughes and Ferrett, 2007).

2.2 Management and Causes of Accidents on Construction Sites

Work conditions and work behaviors are the direct causes of accidents. Proper management throughout the workplace can control these causes in the sense that management can create or maintain a suitable working environment. Health and safety management usually minimizes the possibility of accidents in the working arena by introducing and enforcing standards and regulations and so protecting employees from the risk of workplace injury or even death. This kind of management needs to be committed to administering a safe working environment. (European agency for safety and health at work, 2005).

The workers should be in a position to interact with this management in such a way that their working behavior is controlled and monitored. As a means to that end and in the interests of creating a safer and healthier workplace, workers should be informed and educated.

Hence, Training, in this regard, will develop the workers' skills. Moreover, a system of work that is healthy and safe should be developed and the unsafe practices should be corrected or reported (Amis, 1991).

Work conditions and workers behaviors that are unhealthy and unsafe are known as primary causes of accidents in the workplace. However, a failure in management strategy regarding health and safety rules and procedures may be cited as secondary reasons for accidents in the work environment. For example, an unhealthy system at the workplace, the absence of training in the health and safety aspects of work, bad planning, and maintenance are all contributing factors that can allow for a hazardous working situation and lead to accidents (HSE, 1992).

2.3 Evolution of Health and Safety on Construction Sites

Making a profit was the aim of employers who were managing projects in the early years of the last century. Employers had little or no regard for the health and safety of their workers. One can say that health and safety were not the concern of anybody. For example, employees in the United States who had been injured at work had to take their case against their employer to court in order to claim for compensation. More often than not this proved impossible given the cost of court procedures. Those cases that were fought through the court system often failed if it could be shown by the employer that the worker had been made aware of hazards or had chosen to ignore information on health and safety matters (Alli, 2008).

It became clear that matters of health and safety in the place of employment should be given special attention. Hence, there was the establishment of a national safety council 1913 in the USA. Then there was the establishment of the International Labor Organization in 1959. This organization has provided that health and safety practices should be available either in or near a place of work (ILO, 1977).

A health and safety policy is the direct consequence of recognizing the importance, as a concept, of health and safety in a construction workplace. This concept should be taken into consideration in order to raise its awareness level in a working climate. And a health and safety policy is a source of information that should be available to everybody involved given to everybody to

involve in construction work including clients, contractors, directors, managers, and individual workers or employees (HSE, 2000).

A health and safety policy includes information about everything relevant to health and safety in construction work. In this way, it is possible to identify the terms of knowledge that should be made available and familiar to the worker carrying out the work. Workers on site should be given information about the duties relating to health and safety such as the stability of structures, energy distributors installation, traffic routes, emergency procedures and the risk of fire (HSE, 2000).

Prior to this knowledge, workers should be gives a brief description of the work to be carried out, residual hazards, hazardous material and equipment, marketing of services and drawings of the structure. All this is for the benefits of integrating health and safety into the management of a construction project. It is also a kind of encouragement to the management of a project through identifying the risks and targeting efforts in the field of health and safety. It helps to review health and safety through the life of the project (HSE, 1994).

2.4 Critical Activities on Construction Site

Based on the table and statics below, Figure 2.1, Figure 2.2, Figure 2.3 and Table 2.1, for the activities in the sectors mentioned below. Shows that has high number of accidents either injuries or fatalities in European countries. Also in TRNC, ÇSGB (2011) mentioned that falling from height "YüksekYerdenDüşme" is 11% and falling from the same level "AynıSeviyedenYereDüşme" is 15% on construction sites.

Furthermore, these numbers shows the importance of health and safety plan to be considered on the site work of those activities

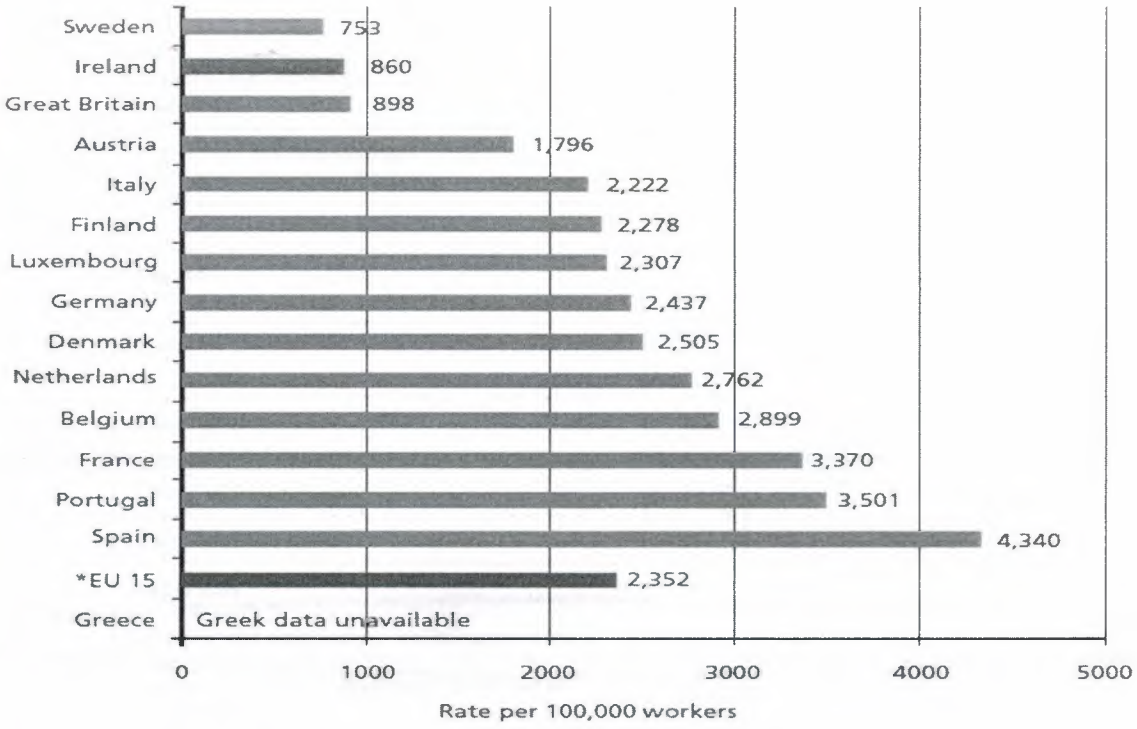

Figure 2.1: Rate of 4 +/- days injuries in EU 2008 (HSE, 2008)

Table 2.1: Accident in some of the construction activities in EU

Type of accident	96/97	97/98	98/99	99/00	00/01
Falls from a height	35%	37%	37%	36%	37%
Slips, trips or falls on level	19%	19%	20%	21%	21%
Struck by moving vehicle	3%	2%	3%	2%	2%
Struck by falling object	21%	20%	18%	18%	18%
Handling, lifting or carrying	8%	9%	9%	10%	8%
Other(e.g. excavation, form work)	14%	13%	13%	13%	14%

Agent group no.	Agent description	2001/02	2002/03	2003/04	2004/05	2005/06p
01	**Surfaces, structures and building access equipment**	2 594	2 338	2 244	2 239	1 866
01.01	Floors (e.g. fell through floor)	374	109	71	65	49
01.13, 01.14	Scaffold	209	215	278	235	199
01.15, 01.16	Ladders	1 195	1 233	1 205	1 186	1 059
01.03, 01.04	Roofs	112	134	131	135	81
01.07, 01.08	Stairs/steps	254	251	167	179	119
01.09	Doors, walls, partitions	71	64	65	71	61
	Other specified agents	367	313	303	322	260
01.90	Not known	12	19	24	46	38
02	**Surfaces and structures – below ground level**	28	25	26	31	21
03	**Systems for the distribution of materials or substances**	6	8	10	9	4
04	**Hand held tools and equipment**	2	3	2	2	1
05	**Systems for energy and storage, motors**	2	1	4	5	3
06	**Conveying/ lifting/storage systems and hand held pushed/pulled trnspt**	180	228	293	265	255
06.06	Elevators, lifts, hoisting devices	21	34	5	9	6

Figure 2.2: Major injuries to employees (workers) due to falls 2001/02-2005/06

07	**Vehicles, plant and earth moving equipment**	673	713	771	805	709
07.26	Lorry loader (n/a after 2002/03)	120	115	-	-	-
07.27	Van/light van	54	60	58	69	67
07.28	Other heavy goods vehicle	128	126	266	293	232
07.29	Trailer	150	183	157	146	155

Figure 2.3: Major injuries to employees (workers) due to falls 2001/02-2005/06

2.5 Responsibilities of Employers and Employees in Relation to Health and Safety

Health and safety of the workers should be ensured at the construction site. It is the responsibility of the employers to take procedures that help the health and safety of workers; thus, the employer should take into consideration the following duties (Dessler, 2001):

- Preparing accident reports.
- Preparing records of maintenance.
- Health and safety notices and information should be posted.
- Employees should be educated and trained on health and safety measures.

It is not only the responsibilities of the employers but also it is the responsibility of the employees to take care of health and safety at the work site mainly through:

- Having the appropriate equipment and the specific protective clothing.
- Any breaking of the rules or codes of practice should be reported (Dessler, 2001).

As well as their responsibilities, the rights of the employees have been mentioned by Downey (1995) as following:

- Knowing the hazards of the work place.
- Participating in the process of health and safety.
- Refusing any work that they believe to be unsafe.

2.6 Overcoming Problems of Health and Safety

Preventing accidents at the construction sites involves much more than merely listing rules or making inspections. What is important is a health and safety management system that is suitable for the specific work and which accords with the law. Some of the measures of overcoming the problems of health and safety have been referred to (Turner, 1965).

The measures can be summarized as follows:

- Hazards should be identified from the beginning, from the earliest design stages and through all other steps in the engineering process.

- Workers should be isolated from harmful substances.
- Employers should replace potentially dangerous substances with ones that secure healthier and safer working environment Protective clothing and equipment should be provided in order to keep the workers safe from hazardous substances or situations.
- Workers should be trained and also should be medically examined before employment.
- Medical programs that develop the standards of health and safety at construction sites should be available.
- Increasing the effectiveness of health and safety can be achieved by following the steps which are stated by Holt (1993), the steps are:
  - Notices and messages related to health and safety should stress the positive rather than the negative.
  - Messages should be given at the place to the right person.
  - Using simple and clear messages allow the worker to comprehend what is announced without difficulty.

2.7 Health, Safety and Security in Construction Site

Expectations of health, safety and security at the construction sites are supposed to be presented by employers to their employees. However, some employers explain away the incidence of accidents or illness at the construction sites as in the natural order of things that cannot be avoided (Jackson, 2004).

Jackson (2004) defines health to be in a state of emotional, mental and physical balance. Health management means to keep persons at the construction sites healthy. Safety has the same meaning, and procedures that ensure safety will prevent the reoccurrence of accidents in relation to work. This will lead to what are called safety programs (Jackson, 2004).

Hence, security means the act of protecting employees in all aspects of their work at their place of work. It should also be emphasized that cooperation between the managers and the representatives of health and safety will lead to a healthy and safe workplace. This healthy and

safe site can be achieved through certain procedures such as investigating hazards and how to avoid them, educating workers about the importance of a secure construction site and putting in place training programs that will lead to the best possible working environment (Jackson, 2004).

In keeping a healthy and safe site, the role played by the managers and supervisors of departments should not be forgotten. An example in this regard is the role of the warehouse supervisor who would demand that workers wear protective clothing and headgear, keep the work area clean, replace damaged or defective equipment and oversee the possible use of drugs or alcohol in the construction site (Jackson, 2004).

More recently, a new position in the construction site has been instituted. This is the officer of for the environment. The role of this officer is mainly to check the level of pollution and its source in the sense of how it effects the environment as well as those who work within it (Jackson, 2004).

2.8 Health and Safety Training

Tsui (1988) states that health and safety training is important for the employees and it should be given at different times and in different ways, That is to say:

- Sessions should take place regularly including all persons related to health and safety.
- Different media should be used, such as TV, video or the internet.
- Health and safety training should be updated using newsletters, posters or bulletin boards.

2.9 Accidents Investigation

An immediate investigation should be made by the experts committee of health and safety once, and the accident occurs in order to guarantee that the site and cause of the accident cannot be altered in any way. Interviews can be conducted as part of the process of determining the cause of the accident and as a way of reviewing what facets of the health and safety program might need review (Eva, 1981).

2.10 The Cost and Benefits of Health and Safety in Construction

Health and safety is an economic as well as humanitarian concern that requires proper management control. One of the most common myths that have plagued this industry is that health & safety comes at a cost. Construction managers tend to believe that introducing and executing measures that ensure health and safety in construction sector will lead to higher cost, and hence lower profitability. However, it has been proved that investment in construction health and safety actually increases the profitability by increasing productivity rates, boosting employee morale and decreasing attrition (Everrat and Frank, 1996).

Decent codes and standards can improve construction safety and health at least cost. Then again, poor codes and standards can contribute to increased costs and disputes with slight impact on construction safety. These costs and disputes arise from interruptions in construction progress, penalties for these interruptions, economic losses, personal injuries and fatalities. Research has shown that safe workplaces and workers increase productivity accompanied by reduced costs and increased profitability (Everrat and Frank, 1996).

It is necessary that employers contribute to maintain a healthy and safe construction sites by investing in additional protective measures. This may include something as simple as appointing extra employees to maintain and guard machines. By ignoring these costs employers run the risk of further accidents. Payments can go to the health and safety committee for posters or health and safety training to finance the purchase of films or to pay for experts to who deliver lectures (Cascio, 1986).However, the resulting benefits of the added costs will include the further reduction of construction site accidents and lesson the occasions of hazardous risk. Other long terms benefits that accrue from the extra expenditure on safety and health include (Cascio,1986):

- Saving on payments for time lost.
- Damage to the equipment.
- Money saved that would otherwise be paid for overtime to complete specific work.
- Money saved on wages for the activities related to the accident.
- Money saved for medical treatment to the victim or victims of accidents and the time lost for post-accident investigation.
- Time saved on training new workers to complete jobs.

2.11 Organizational Health and Safety Programs

Pirani (1976) mentions two main causes for accidents. First, there is the work condition that could be unsafe physically and environmentally. Secondly, there is work behavior that may be sometimes unsafe sometimes. Lack of protective equipment, inadequate machine guards and defective Equipment, Are examples of the physical aspect while Noise, stress, fumes and radiation are examples of the environmental aspect (Pirani, 1976).

As stated before, unsafe behavior might cause accidents. A typical instance of this is a worker lifting or twisting heavy object is an unsafe way act. To solve this problem, we must correct the procedure by providing a set of instructions that will correct the movement or furnishing a device to be used by the worker that can carry out the action safely. Accordingly, work conditions and workers behaviors can be improved either through new instruction about manual movements or by engineering controls. Safe behavior can be increased through management supervision and discipline (Pirani, 1976).

2.12 Aims and Functions of Occupational Health and Safe Services

The International Labor Office (1996) has specified the main concerns of occupational health services:

2.12.1 Suitability for Job

People who have a history of medical problems cannot be suitable for certain jobs. In this sense, an examination or a questionnaire before employment will help to determine whether the person is suitable or not for the specific job is they applying for. This examination can be repeated regularly in order to be sure that the person is still able to continue or not. Alternative jobs can be offered as advice or suggested by the health service when it is found that the worker cannot meet the job requirements they are applying for (International Labor Office, 1996).

2.12.2 Safety Training

All workers in a workplace should be informed about the health problems that might face them. This is the responsibility of an occupational health service. It is the health service's responsibility

to explain to the workers all the measures that can protect their health. Based on this, the workers should understand what they should do as a necessity. For example, workers should wear face masks or any other protective material when required by the job, and instructions and training should be given about the procedures of first aid that will help the employees in case of danger (International Labor Office, 1996).

2.12.3 Certain Appropriate Service and Advice

Appropriate and specific services and advice will be given to different groups of people when they are exposed to certain kinds of material. Toxic agents, for example, are harmful to all people. Among the services offered is the identification of the type of health and safety hazard any group of workers might be exposed to. It has been proved that there is a direct relationship between the kind of illness suffered by the employee and the kind of exposure, in terms of hazardous materials, that the worker has had in the working environment. For example, it can refer to the diseases that might attack the lung, nose and heart if workers are exposed to asbestos, carbon disulfide or other toxic materials that will directly attack those parts of the body (International labor Office, 2010).

2.12.4 Responsibility of Occupational

It is the responsibility of the occupational health and safety service to overcome or determine the level of toxic materials. Procedures should be put in place as precautionary measures when there is a sign of overexposure. Also, medical experts can prevent or minimize the risk in relation to health and safety by designing and providing the sites with safer machines and equipment (WHO Regional Office, 2002).

2.12.5 Health and Safety Education

Health and safety education and counseling can be offered by occupational health and safety service. The occupational health and safety service can give advice to the workers in relation to

certain topics important for their health and safety. For example, by informing those abuses of smoking or drugs and the benefits of exercise, the workers can improve their health and safety and productivity and they can minimize illnesses and other related problems. Organizing programs in relation to health and safety is another activity that can be done by the health and safety service (WHO Regional Office, 2002).

CHAPTER 3

HISTORY OF THE CONSTRUCTION SAFETY REGULATIONS GENERAL

The first European orders on safety and health at work were depends on the foundation of the common market coordination requirements. This was due to a lack of an overt legislative capability in the agreement in the field of safety and health at work until the mid-1980s. Until then occupational safety and health was seen as an annex to market coordination and the economic policies of the European Economic Community. For example, Directive 77/576 EEC on the coordination of national laws on safety signs at the workplace or Directive 78/610 EEC on the coordination of occupational exposure restrictions to vinyl chloride monomers were depends on this basis (European Directives. 2011).

The Single European Act 1987 was a most important step forward in that it introduced a new official provision on social policy to the agreement aiming at "improvements, mainly in the working environment, as regards the health and safety of workers." By inserting these conditions into the agreement, the significance of safe working circumstances was made obvious. Furthermore, the new Social Chapter authorized the European Commission to encourage social conversation between employers and labor representatives at a European level (European Directives, 2011).

The construction industry has earned the reputation of being a dangerous or highly hazardous industry because of the disproportionately high incidence of accidents and fatalities that occur on construction sites around the world .Construction worldwide is a significant employer of labor as large proportions of its activities and operations have labor-intensive characteristics (Haupt and Coble, 2000). In Europe, for example, the industry of construction employs about 7.5% of the whole industrial labor force (some 11 million workers). Construction of European accounts for 17.5% of all job-related accidents and injuries (some 1 million accidents per year). Construction is responsible for about 22.5% of all work-related deaths, representing some 1500 fatal accidents per year (Coble and Elliott, 2000). For many years construction has consistently been among those industries with the highest injury and fatality rates (Khalid, 1996).

Despite sophisticated safety and health regulations in the majority countries, high rates of injury and fatality persevere. The procedures intended to prevent such accidents are usually mandated by the appropriate occupational safety authority in each country (Gee and Saito, 1997). Scholars and professionals within the construction industry recognize that regulations and legislation by themselves are not enough to bring about the preferred purpose of zero accidents and incidents on construction sites (Ratay, 1997). However, adherence to them alone does demonstrably improve site safety. If reasonable in philosophy, adequate in detail, and worded without ambiguity, legislation and regulations provide a basis for the employment and enforcement of good construction practices. According to Ratay (1997), good codes and standards can improve construction safety at minimal or no extra cost. On the other hand, poor codes and standards can contribute to increased costs and disputes with little or no impact on construction safety. These costs and disputes arise from delays in construction development, penalties for these delays, financial losses, personal injuries and fatalities (Ratay, 1997).

Research conducted by the National Safety Council (NSC) and the Du Pont Company(Human Performance Technologies, 1998) ,however, suggests that, based on the root causes of accidents that were analyzed, the focus of standards and regulations on physical conditions might be misdirected Table 3.1. The results of both studies strongly support the notion that the behavior of workers on construction sites needs to be changed if safety performance is to be improved. The question that arises is whether unsafe behaviors can be changed by legislation or through effective management.

Table 3.1: Root causes of industrial accidents

Causes National Safety	**Council (%)**	**Du Pont Company (%)**
Unsafe conditions	10	4
Unsafe behaviors	88	96
Unknown causes	2	-

The industry has not responded well to demands for improved productivity and quality, attention to environmental issues, reduced life cycle costs, value for money and improved safety

performance (Haupt and Coble, 2000), In the increasingly global competitiveness of the construction business, quality control and quality assurance for a consistent level of performance in health and safety in construction is no longer optional (Kashef et al., 1996). In fact, it is critical to advocate more strongly for a concerted engagement in global health issues such as safety and health in international construction to make the industry a safer one for construction workers throughout the world. In response, safety and health regulations have been subjected to major revisions during the last three decades. In some cases, new legislative and regulatory approaches have entirely replaced existing regulations and legislation. The emphasis of these new pieces of legislation in Europe, the United Kingdom and New Zealand, for example, has been on individuals and their duties (Kashef et al., 1996).

3.1 Birth of Concept

The research and regulation of occupational safety and health are a comparatively current observable fact. As labor movements arose in response to worker concerns in the wake of the industrial uprising, worker's health entered consideration as a labor-related issue. In 1833, HM Factory Inspectorate was created in the United Kingdom with a remit to examine factories and guarantee the avoidance of injury to child textile workforce (Edmonds, 2013).

In 1840 a Royal Commission published its findings on the state of circumstances for the workers of the mining industry that recognized the terribly hazardous environment that they had to work in and the high frequency of accidents. The commission sparked public indignation which resulted in the Mines Act of 1842. The act set up an inspectorate for mines and collieries which resulted in many prosecutions and safety improvements, and by 1850, inspectors were able to enter and inspect building at their carefulness (Edmonds, 2013).

Otto von Bismarck inaugurated the first social assurance legislation in 1883 and the first worker's compensation law in 1884 the first of their kind in the Western world. Similar acts followed in other countries, somewhat in response to labor conflict (Goetsch, 2008).

3.2 Initial Regulations

The safety and health movement has changed and developed since the industrial revolution. After the1800s different types of accident prevention programs were established in the workplace. Widely used accident prevention techniques included failure minimization, isolation, lockouts, fail-safe designs, personal protective equipment (PPE), time replacements, redundancy, screening and so on. Before that time, employers had little interest for the safety of the worker. Between the first and Second World War, industry discovered the relation between quality and safety (Goetsch, 2008).

3.3 Progresses and Amendments

OSHA was established in 1971 and started to officially work that same year. Following establishment of OSHA, a training institute was established to educate private sector and federal government safety personnel. Since its creation, over 210,000 safety professionals have received training at the training institute. In 1992 OSHA Training Institute began partnering with colleges and universities to conduct workplace safety classes (USDOL-OSHA, 2011).

At 1972 the first OSHA state plans standards approved in South Carolina and extending to the government workers. That same year OSHA issued standards for construction workers. Subsequently OSHA starts to impose various laws for different workplaces and sectors. In 1975 OSHA established On-site Consultation programs in order to help small sizes businesses (USDOL-OSHA, 2011).

On Jan16th 1981OSHA issue the hearing conservation standard which requires that hearing protective equipment be provided to workers who are exposed to noise levels above 85decibels. In 2007 OSHA confirms during a rule that employers must pay for PPE such as respirators, earplugs and gloves. OSHA has responded to any diseases and disasters, since of its creation. For example in September 11, 2001, OSHA sent team to Ground Zero in New York City and the Pentagon to supervise worker exposure to hazards through cleaning and recovery operations and to healthy test and distribute respirators. During the deepwater horizon oil spill incident which occurred on 29thof April, 2009 in USA, OSHA acted as part of a coordinated federal response, to ensure that the workers were protected from chemicals hazards (USDOL-OSHA, 2011).

The Regulations came into force in April 2012 and modernized former asbestos rules to take account of the reality that in the European Commission's view, the UK had not entirely implemented the EU instruction on exposure to asbestos as set out in EU instruction 2009/148/EC). The changes brought about by the new Regulations are quite small and mostly have an effect on some types of non-licensed work with asbestos counting medical surveillance, record keeping and announcement of work (European Directives, 2011).

The Health and Safety (Sharp Instruments in Healthcare) Regulations 2013 (S.I. 2013/64) which came into effect on 11 May 2013, necessitate employers to guarantee that the hazards from needles and other sharps used in healthcare are successfully controlled. The regulations stipulate that healthcare employers and contractors must provide appropriate preparations for the safe use and disposal of sharps and must train workers to understand the risks. As swell, the Regulations necessitate employers and contactors to investigate any work-related incidents relating sharps, and to take suitable action (Health and Safety Executive, 2013).

CHAPTER 4

CONSTRUCTION SAFETY REGULATIONS IN THE WORLD

Occupational health and safety has been gaining great importance day by day with the development of technology and increasing population especially young workers in working life. OSH not only interests workers in construction, mining or any other workplaces but also everyone as the same case in all countries. Also the safety precautions have a special importance for the productivity of workplaces which lead to a healthy society and improved economy as well (Hughes and Ferrett, 2004).

Occupational health and safety constitutes all efforts based on prevention of these accidents and diseases. As a consequence of the dynamic nature of production and work environment, occupational health and safety requires up-to-date and inclusive information. Also the multidisciplinary structure of occupational health and safety necessitates a wide range of scientific and technical expertise (Hughes and Ferrett, 2004).

4.1 European Union

4.1.1 Safety of Workplaces

Ensuring safe and healthy work surroundings for more 217 million workers in the EU is a planned object for the European Commission, working directly with Member States, social associates, and the other European Union institutions and bodies. As risks to workers' safety and are health largely similar across the European Union, there is a obvious role for the Union in helping Member States to address like hazards more competently as well as in ensuring a level playing field throughout the EU (Eurofound, 2007).

Risk prevention and the promotion of safer and healthier conditions in the workplace are key just to improving job quality and working conditions, but also to promoting competitiveness. Keeping workers healthy has a direct and measurable positive impact on productivity, and contributes to improving the sustainability of social security systems, as explained at Appendix 1, Preventing workers from suffering serious accidents or occupational diseases and promoting workers' health throughout their working life, from their first job onwards, is key to allowing

them to work for longer. A reduction of 27.9 % in the incidence rate of accidents leading to absences of more than three days was achieved in the EU between 2007 and 2011, According to a recent Euro barometer survey, a large majority of workers express satisfaction with workplace health and safety in their current job (85%) and over three quarters (77%) say that OSH information and/or training is available in their workplace (Eurofound, 2007).

4.1.2 Scaffolds and Ladders

The most general injury made by ladder climbers is bruising from falling off a ladder, but bone fractures are general and head injuries are too probable, based on the temperament of the accident. Ladders can slide backwards owing to broken down base pads which generally fit into the ladder stiles. If poorly worn, they can permit the aluminum to make contact with the ground rather than rubber or plastic, and so lesser the rubbing with the land. Ladder stabilizers are obtainable that augment the ladder's grip on the land. One of the first ladder feet was existing in 1936 and today they are standard apparatus on the majority big ladders (Eurofound, 2007). A ladder face-off, or reside, is an apparatus fitted to the peak of a ladder to grasp it absent from the wall, this enables the ladder to apparent overhanging difficulties, for example the eaves of a roof, as well as enlarge the safe height of working for a known length of ladder. Working at height falls from heights are the majority general cause of injuries and fatalities. Causes contain: working on a platform or scaffold without protector rails, or without a safety harness appropriately attached; weak roofs; and ladders that are poorly maintained, situated and protected. The entire construction procedure should be planned, preliminary with the design step, to minimize the hazard of falls, The Height Working Regulations , which were Recognized in 2005 following a European Union directive, state As explained at Appendix 1 ; Every employer shall make certain that a ladder is applied for work at height only if a hazard assessment has demonstrated that the utilize of more appropriate work apparatus is not justified because of the low hazard and the short period of utilize or obtainable features on site which he cannot alter (Eurofound, 2007).

4.1.3 Work at Heights including Roof work

The common position aims to set out the necessities concerning to quite precise situations at work, namely the utilize of work apparatus allowing access to as well as the utilize of work stations at a height. It goals to cover all sectors of action, and contains a apparent requirement to choose apparatus which offers sufficient safety against the hazards of falls from a height, as well, where suitable, for the specific and proper training of workers. Ladders, scaffolding and ropes are the apparatus the majority usually used to carry out temporary works at a height, also the general position sets out the way in which this apparatus may be utilized by workers under the safest circumstances as explained at Appendix 1 (Eurofound, 2007).

4.1.4 Excavations, Shafts, Earthworks

Before starting any excavation work think about all potential risks counting trench fall down, people and vehicles falling into excavations and close by structures being undermined. Then put proper safety measures in place. position and mark all underground services, as well as take precautions to keep away from them; make certain supplies of appropriate material for supporting an excavation are on the field; make sure there is a safe process for putting in as well as removing supporting objects As indicated at Appendix 1 (Eurofound, 2007).

4.1.5 Fire Precautions

The fire safety of the built environment is immensely important to everyone -employers, designers, architects, fire authorities, construction industry and, of course, the people who inhabit buildings- the general public. New European tools for testing and classifying the performance of construction products and systems in fire have introduced significant changes for everyone designing and specifying fire safe buildings. Further changes in both UK and Europe are anticipated, including the environmental impact of fires. Employers are legally required to carry out a fire risk assessment of their workplace that should identify all potential fire hazards and any associated risks As explained at Appendix 1, Thereafter they should take action to minimize or

eliminate any such hazards and risks, and provide a safe system for maintenance as appropriate (Eurofound, 2007).

4.1.6 Personal Protective Equipment

The European Union initiated Directive 89/686/EEC in order to make sure equally safe products all over the European Union. Before the condition of the Directive can be applied its text has to be "transposed" into public legislation. Each Member State has to integrate the provisions into its legislation, and it is the transposed text that is applied at the public level, It is a necessity for PPE, the products having the unique feature to supply for guard against specific risks, to meet this challenge: to guarantee the user's safety and health in specific conditions. The company informs about the type of risks against which his product protects (Eurofound, 2007).

Personal Protective Equipment (PPE) is unique products as far as the consumer buying it buys protection encountered at house, work and leisure. annual statistics of mortal and main work accidents do remarkably explain the significance of safety and avoidance, personal health and safety are essential rights and people suppose and desire a high point safety at work, house and at leisure, Certain types of Personal Protective Equipment are expelled from the extent of the Personal Protective Equipment Directive, namely PPE specially designed for utilize by armed military or in the repairs of regulation as well as order, PPE for self defense, PPE designed as well as manufactured for private utilize against full of atmosphere circumstances, damp, water and heat, PPE proposed for the safeguard or save of persons on vessels or aircraft, not worn all the time plus helmets also visors proposed for users of two or three wheeled motor vehicles As explained at Appendix 1.

The Commission of European has been active in the chase of this perfect initiating a sequence of directives development health and safety at work and providing for high quality personal protective equipment, A significant step ahead was just made with the acceptance by the EC on 27th march 2014 of a suggestion for a directive of the European Parliament as well as of the Council on PPE (Eurofound, 2007).

4.1.7 First Aid

People at work can suffer wounds or be taken sick. It doesn't matter whether the wound or sickness is caused by the work they do or not, it is significant to offer them direct awareness and call an ambulance in grave cases. First aid at work contains the arrangements you should make to guarantee this occurs. It can keep lives and avoid small injuries becoming main ones, Workers should be knowledgeable about first aid preparations. This should comprise the position of the apparatus and first aid workers. The information should be given when opening the work, with the information obviously displayed in applicable areas such as staff rooms, a chosen person should be in charge for the contents of the first aid kit / position and the area where people that need health think about are treated. They also summon a doctor or ambulance while this is required. It is superior practice that someone has received first aid teaching. necessities for first aid training may differ according to Member State and the numeral of people in the place of work As focused at Appendix 1 (Eurofound, 2007).

According to the EU directive 2000/56/EC, all European Union countries were desired must by 1 October 2003, have taken the essential measures to guarantee that applicants for driving licenses should know how to behave in the occurrence of an accident, and the actions that they can take to support road accident fatalities; counting emergency action like evacuation of passengers as well as fundamental knowledge of first aid. The directive points besides the requisite of first aid training and refresher courses for proficient drivers (Eurofound, 2007).

First Aid contains methods and techniques that enhance practices associated to the prevention, the attentiveness and the direct reaction to health emergencies. First Aid can be applied not only in relation to road safety, but moreover in the household, place of work, as well as recreational area, Education in the protection with saving of lives share common foundations, being practical and giving confidence to act. This education is obtained through consciousness and refreshment initiatives such as media campaigns, training courses either in a classroom environment, CD-ROM or through an internet based e-learning organization. It can as well take place through participation in community or group actions. It is crucial that first aid learning shows consideration for and pays admiration to local circumstances, culture and capacities (Eurofound, 2007).

Furthermore, training people to cope with road wounds should contain information correlated to decreasing both the hazard of a crash by wearing reflective objects or not driving after drinking alcohol, and the harshness of wound by wearing helmets when riding a motor cycle (Eurofound, 2007).

4.2 USA

4.2.1 Medical and First Aid

First aid is a small basic but important regulation in the field of construction safety in USA; it is a condition of OSHA that employees be given a protected and healthy workplace that is rationally free of occupational risks. However, it is unworkable to anticipate accidents not to occur. Therefore by referring to USA construction safety regulations at Appendix 2, employers are responsible to supply first aid personnel and supplies proportionate with the risks of the workplace. The details of a workplace first aid and medical program are dependent on the conditions of each workplace and employer (Oregon OSHA, 2011).

4.2.2 Scaffolding

USA OSHA's scaffold typical contains requirements for both supported and suspended scaffolding furthermore to common necessities for capacity and platform construction, falling object protection ,safe access, fall protection, safe utilize, and training. The standard moreover includes extra necessities for specific types of scaffolds. When scaffolds are not erected or utilized properly, fall hazards can take place. About 2.3 million construction workers regularly work on scaffolds. Protecting these workers from scaffold associated accidents would avoid an estimated 4,500 injuries and 50 fatalities each year, therefore based upon USA construction safety regulations at Appendix 2 some precautions should be considering such as; Scaffolds should be set on rigid footing, not erected or moved within 10 feet of power lines Employees are not allowed to work on scaffolds in bad weather or high winds unless a skilled person has determined that it is safe to do so. And the significant considering that Scaffolds should not be loaded with more weight than they were designed to support (Oregon OSHA, 2011).

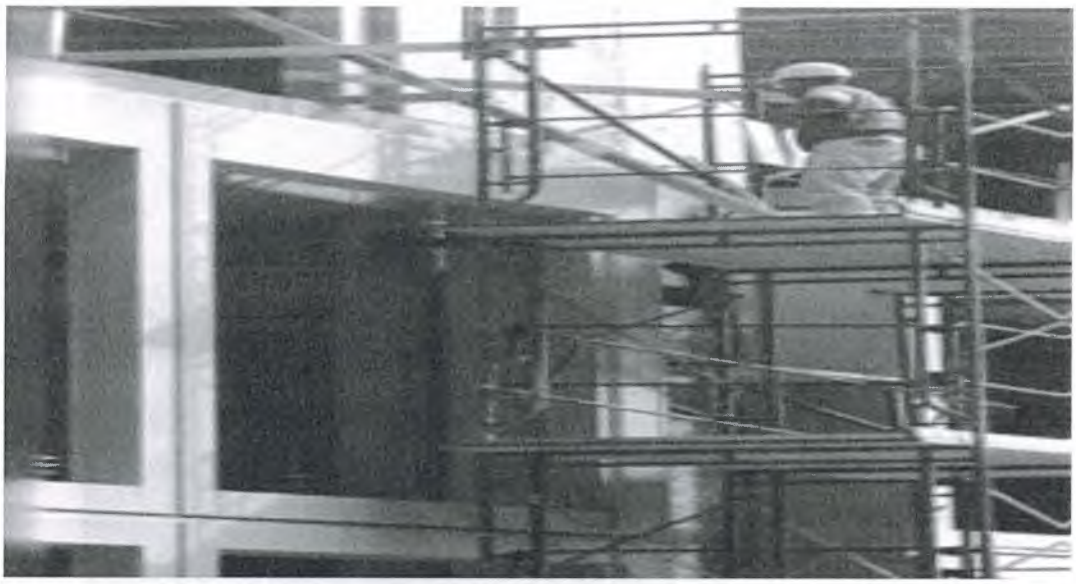

Figure 4.1: Typical Scaffolding (Oregon OSHA, 2011)

4.2.3 Fall Protection

Each year, falls always account for the largest numeral of fatalities in the construction industry. A number of factors are frequently concerned in falls, contains unstable working surfaces, misuse or failure to utilize fall protection apparatus and human fault. Studies have shown that using guardrails, safety nets, fall arrest systems, covers and restraint systems can stop many deaths and injuries from falls, so referred to USA construction safety regulations at Appendix 2 some precautions should be considering such as; using aerial lifts or elevated platforms to supply safer elevated working surfaces, Erect guardrail systems with toe boards and warning lines or set up control line systems to keep workers near the edges of floors and roofs, Cover floor holes; and utilize safety net systems or individual fall arrest systems (body harnesses) (Oregon OSHA, 2011).

Figure 4.2: Typical Fall protection (Oregon OSHA, 2011)

4.2.4 Ladders and Stairways

Ladders and stairways are another resource of injuries and fatalities in between construction workers. OSHA estimates that there are 24,882 injuries also as many as 36 fatalities per year due to falls on stairways and ladders used in construction. almost half of these wounds were severe enough to desire time off the job, therefore based upon USA construction safety regulations at Appendix 2 some precautions should be considering such as; utilize the correct ladder for the task, inspect a ladder before make use of for any defects, considering the manufacturer's rated ability for loading ladders, keep away from using ladders with metallic components close to electrical work and overhead power lines, and also for stairways should considering that Stairway treads and walkways must be free of unsafe objects, debris and materials, Make sure that treads cover the entire step and landing, as well as Stairways having four or more risers or rising more than 30 inches must have at least one handrail(Oregon OSHA, 2011).

Figure 4.3: Ladder in use (Oregon OSHA, 2011)

4.2.5 Trenching and Excavations

Trench collapses source dozens of fatalities and hundreds of injuries each year, therefore based upon USA construction safety regulations at Appendix 2 some precautions should be considering in order to save workers life such as; inspecting trenches by a competent person prior to entry, constantly supply a way to exit a ditch such as a ladder, stairway or ramp no more than 25 feet of lateral travel for employees in the trench, and Employ a registered expert engineer to design a protective system for trenches 20 feet deep or bigger by considering Sloping to guard workers by cutting back the ditch wall at an angle inclined away from the excavation not steeper than a height/depth ratio of $_{1/2}$:$_1$, according to the sloping necessities for the type of soil, Maximum allowable slopes for excavations less than 20 ft. (6.09 m) based on soil type and angle to the horizontal as shown in Table 4.1, (Oregon OSHA, 2011):

Table 4.1: Allowable slopes

Soil type	Height/Depth ratio	Slope angle
Stable Rock (sandstone)	Vertical	90°
Type A (clay)	3/4 :1	53°
Type B (gravel, silt)	1:1	45°
Type C (sand)	1/2:1	34°
Type A (short-term)	12:1	63°

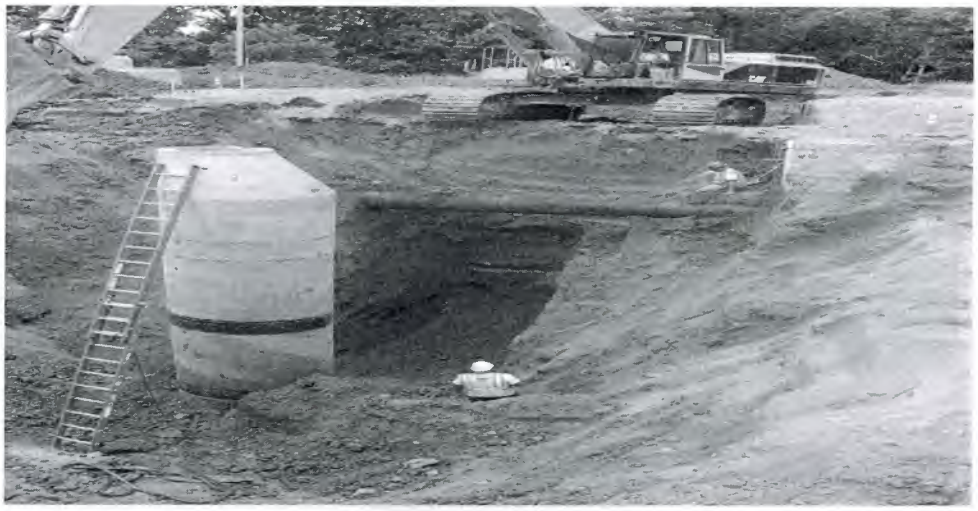

Figure 4.4: Excavation work can be incredibly hazardous (OSHA)

4.2.6 Personal Protective Equipment (PPE)

Personal Protective Equipment refers to helmets, goggles, protecting clothing, or other garments or apparatus designed to keep the wearer's body from injury or infection. The risks addressed by protective equipment contain physical, electrical, heat, chemicals, biohazards, and airborne particulate matter (Oregon OSHA, 2011).

Personal Protective Equipment is one of USA Regulations of construction safety in order to prevent injuries and fatalities among construction workers, many workers had been suffered of injuries and fatalities due to neglecting Eye and Face Protection, Foot and Hand Protection and Head Protection so that based upon USA construction safety regulations at Appendix 2 some

precautions should be considering such as wearing Safety glasses or face shields during work to protecting Eye and Face from strange objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles), furthermore wearing safety shoes or boots with slip-resistant and puncture-resistant soles In order to save workers from crushed toes when working around heavy equipment or falling objects, as well as wearing right safety gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards),in addition wearing safety hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards (Oregon OSHA, 2011).

Figure 4.5: Typical Personal Protective Equipment (Oregon OSHA, 2011)

4.3 Turkey

4.3.1 Workplace health and safety units

It is arranged to regulate the principles and procedures such as workplace practitioners who will be assigned in a common health and safety unit with workplace health and safety unit, the qualifications of job security experts, their numbers, their assignments, their duties, their responsibilities , their working conditions, their training and certification, the workplace health and safety units that will be installed in the workplace with characteristics of common health and safety units, personnel, equipment, apparatus and equipment that there should be in these units

, qualifications and training of personnel assigned, the reception of the service from public health and safety units As explained at Appendix 3 (Official Gazette,2009).

4.3.2 Safety Training

Regarding knowledge of occupational safety that must be given to workers at places of work, the associated body of current Turkish Regulations stipulates some circumstances. According to the Turkish Regulation on Work Health and Safety, an employer must provide workers with the required HS training and instructions about work activities, workplaces, potential risks, protective and preventive measures, and other personnel As indicated at Appendix 3,This training must take place especially when (Ulubeyli et al., 2014):

- Workers are newly employed
- The workplace or work definition change.
- Work machines are distorted.
- Working methods modify.

4.2.3.3 Personal Protective Equipment (PPE)

The Turkish regulation on personal safety equipment significantly emphasizes that employer must provide PPE without any charge and keep it in hygienic conditions .Employers must also provide practical training and information on when and how PPE will be used, and against which risks, As explained at Appendix 3. Personal protective equipment (PPE) refers to protective clothing, helmets, goggles, or other garment or equipment designed to protect the wearer's body from injury by blunt impacts, electrical hazards, heat, chemicals, and infection, for job-related occupational health and safety purposes (Ulubeyli et al., 2014).

The main reason of occurrence injury and work accidents in the construction site is the lack appropriate protective equipment for instance workers were noted carrying out high risk

activities such as painting, excavations, concreting among others without the right protective gear such as helmets, masks, ear muffs, goggles and overalls (Ulubeyli et al., 2014).

4.3.4 First aid Kits and Accident Reporting

Construction sites are dangerous places, and first aid and rescue equipment should always be available. What is needed depends on the size of the site and the numbers employed, but there should be a blanket and a stretcher. On large sites with more than 200 people are employed, there should be a properly equipped first aid room. On any construction site of that size, at least one person on every shift should have been trained in first aid to a nationally recognized standard as explained at Appendix 3. On day -to-day works procedures, an accident register book should be kept at the site, in which all types of minor injury such as bruises, to major accidents like imputing disability and fatal should be recorded (Official Gazette, 2009).

4.3.5 Work at Height

If the impermanent work at a height cannot be executed safely on an appropriate surface, and under proper ergonomic circumstances, the work apparatus most proper to guarantee and keep up safe working circumstances must be chosen. Combined protection measures will take precedence over personal protection measures. The dimensions of the work apparatus must be suitable to the nature of the work done, the load envisioned, and must permit way without hazard, The access to the impermanent workplace at a height will be made by utilizing the most suitable routes as well as vehicles, taking into thoughtfulness the regularity of passage, the height of the platform, and the period of the usage. The selection of the vehicles must allow the evacuation of the workers in an imminent hazard. There must not be any hazards of falling when passing among the vehicles, routes and platforms, gangways or decks as explained at Appendix 3 (Official Gazette, 2009).

4.3.6 Ladders

Ladders will be located make sure constancy throughout their use. Portable ladders must have a rest on a stable, burly, properly sized, immobile footing so that the rungs stay horizontal. Suspended ladders must be attached in a safe manner, with the exemption of rope ladders, they

must not be displaced and their swinging must be disallowed, The feet of the moveable ladders must be banned from slipping by securing the upper and lower ends or by using an anti slip material or by any other collection of equivalent effectiveness, As explained at Appendix 3 (Official Gazette, 2009).

4.3.7 Scaffolding

Based on the complexity of the scaffolding selected, an assembly, utilize and dismantling plan must be prepared by someone who is skilled. This plan can be in the regular form that contains the specific details correlated to the scaffolding, Bearing mechanism of scaffolding must be prevented from slipping, whether by connection to the bearing surface, condition of anti slip machine or any other means of equivalent effectiveness, The dimensions, form and outline of scaffolding decks must be suitable to the nature of the job to be performed and appropriate for the loads to be carried and allow work and passage in safety, As explained at Appendix 3 (Official Gazette, 2009).

CHAPTER 5

CONSTRUCTION SAFETY REGULATIONS AND MEASUREMENTS IN TRNC

The organization for the prospect program in Cyprus has been working on health and safety in the work place since 2005 throughout, its private part progress project for Turkish Cypriot community .When the first training assembly and workshops were prepared on European Union (EU) regulations and standards, near the beginning in 2004, approximately no information was existing to Turkish Cypriot enterprises on the supplies and benefit of complying with these regulations. The Occupational Health and Safety standard (OHSAS 8001) was one of the first EU principles to be covered by UNDP consciousness seminars (Zaccaro, 2012).

According to statistics, in 2010, in the Turkish Republic northern Cyprus, the manufacturing industry was the occupation with the maximum number of registered accidents (70 recorded accidents), followed by the construction sector with 56 registered accidents. In spite of these statistics, the part of northern Cyprus has made marvelous efforts to reduce the hazards and decrease the numeral of accidents and fatalities in the workplace. Lately, there has been a enormous raise in awareness of health and safety practices at work in the northern Cyprus. With more than 55 civil works contracts awarded in the past five years ranging from 10,000 to 25 million Euros each and roughly 800 workers employed health and safety quickly became a main concern issue for UNDP in Cyprus (Zaccaro, 2012).

The goal of these Regulations is to set down the main necessities for the protection of the safety, and health of workers and persons working on construction sites and to provide further effect to Council Directive 92/57/EEC on the lowest safety and health supplies at impermanent or mobile construction sites. These Regulations are designed to elucidate and make stronger the universal responsibilities of all parties as regards securing occupational safety, and health in construction occupation, counting those of Clients, Project Supervisors, Designers, Contractors and Employees. These Regulations concern to all construction projects counting the alteration, decoration, repair of buildings and the installation, maintenance and removal of mechanical and other systems fixed within or to structures (Health And Safety Authority, 2013).

5.1 Main Concepts of the Construction Safety Regulations and Measurements in TRNC

There are no published studies on construction Safety regulations and measurements in the North of Cyprus (TRNC). In 2009 Northern Cyprus, ministry of labor and social insurance labor office put into affect new OSH law consistent with these in the EU, there are rules and regulations but there is no enforcement. The new TRNC OSH law prepared in harmony with EU OSH low was accepted by the TRNC parliament members and published in the official newspaper on the 14th of July 2008 and came into force on the 15th of April 2009. The labor office is responsible from its implementation. The employer responsibilities are made clear in the new law. An important feature is to force employers to make risk analysis for their company and report the results to the labor office. This law also includes the matter that, employers should give pre-employment to employees. Another important matter is that the idea of employees should be take into accounting during the risk analysis (Yranheikki and Savolainen, 2000).

According to these statistics data that collected from ministry of labor and social security in north Cyprus that shown in Table 5.1 which is taken from Appendix 4b , the most accidents occurred during years 2101–2014 in the field of construction which is 269 people died, and it's a huge number compared with the number of fatalities in the other sectors, furthermore in the construction sector, the most work accidents occurred by Falls from a height such as falls from scaffolds, ladders and stairways, and so on, then the second most work accidents occurred by falling objects as seen in Table 5.2 regarding to Appendix 4b.

Type of accident	2010	2011	2012	2013	2014
Falls from a height	72	64	61	52	53
falls on level	17	24	20	22	26
electricity, heat, chemical contact	22	22	16	26	12
falling object	33	31	23	23	13
Slip and subsidence	1	3	1	2	7
Other Occupational Accidents	-	-	2	-	2

Table 5-2: Accident in some of the construction activities in TRNC (MoLLS-TRNC)

Type of accident	2010	2011	2012	2013	2014	2010-2014
Construction	56	53	56	59	45	269
Mine	1	0	2	1	7	11
Agriculture	12	6	8	14	7	47
Education	14	11	5	8	4	42
Electricity, Gas, Steam Water Production Distribution	11	2	10	6	7	36
Hotels and Restaurants	37	49	29	20	37	172

Table 5.1: Work Accident in some activities in TRNC (MoLLS-TRNC)

The aim of the ministry of labor and social insurance labor office is to monitor and inspect workplaces in order to understand the current OSH situation and determine any violation of OSH rules and regulations. However, after further consultation with the chair of the Cyprus Chamber of Industry, it became clear that there is a lack of inspection and hence data about this topic therefore the current understanding of the situation is incomplete (or questionable).It is observed that the ministry of labor and social insurance labor office statistics are classified in two different ways which respect to the economic fields, and type of accidents occurred. Another observation is that managers of companies only report serious accidents which employee cannot work for a while; however they do not report occupational illness such as arm and low back pain (Yranheikki and Savolainen, 2000).

5.2 Main Concepts of the Construction Safety Regulations and Measurements in Turkey

Turkey unfortunately witnessed several grievous work accidents in 2014. The explosion followed by the fire in the Soma mine, the explosion followed by the flood in the Karaman mine and the elevator break down in the site of construction at the center of Istanbul are just some new examples of unfortunate and deadly job accidents in Turkey. The victims are really serious, that they have caused an attentive for main legislative improvement for safety of workplace. While this improvement should definitely not have anticipated the loss of hundreds of workers life and leaving behind hundreds of families without a parent, it is obvious that employers must be much

more guarded in knowing and, more significantly, implementing the appropriate safety measures. This was a message (hopefully) learned at enormous cost (Gurhan and Melda, 2014).

Occupational injuries became an important problem after the 1980s as a result of the rapid change in industry. In 2006 data there were 79.027 occupational injuries and 574 occupational illnesses in Turkey. Furthermore, recently fatal accidents increased 100% and reached1601. This data was taken from the social insurance department and is not complete understanding the true number since all the companies are not registered. Therefore, these data are not reliable to analyze the current and are not reporting accidents, injuries of workers in the workplace.

Nevertheless this data gives us an idea about the current OSH situation in Turkey.21% of work injuries occurred due to trauma from falling objects and 12% due to employee falls. In Turkey, 14% of the occupational injuries happened in the production of metal goods and 9% is in construction industry. 25% of the fatal injuries happened in construction, 10% in transportation and 6% is in mining industries. According to this statistics Turkey has the highest rate of occupational injuries compared to other European Union and other candidate countries. In recent years, legislation of occupational health and safety improved by harmonizing with EU but implementation is inadequate (Gurhan and Melda, 2014).

Although big companies have problems for implementing OSH standards, SMEs are unable to take the responsibility for occupational injuries because several reasons. The biggest problem for occupational health and safety is because of the subcontracting. With subcontracting, SMEs in Turkey pay employees lower salaries, do not apply legislation properly and do not take any responsibility as a company. Because of the globalization in production, use of subcontractors increased in SMEs. Most of the occupational injuries happened in such a workplace. Two-thirds of the private sector workforces are employed by SMEs. Because, OHS is not well applied in such a workplace; twice as many fatal accidents occur compared to big companies. The main reason for occupational injuries in SMEs is inadequate training. The workers are not aware of the OHS rules and regulations (Gurhan and Melda, 2014).

According to the Turkish Social Insurance Agency (SosyalSigortalarKurumu-SSK), the annual loss of working days due to illnesses or accidents at work was calculated at 2 million through the years 1997-2006 (OSHA, 2010). The result of this loss is about 36 million Turkish Lira (about

25 million US dollars), according to the Turkish Ministry of Labor and Social Security (Çelikağ, 2008).

In Turkey, construction is an industry in which occupational incidents are repeated. Accidents are the most serious type of these incidents at construction fields. Their yearly statistical work accident data compiled from two different sources (Social Security Institution of Turkey and Turkish Statistical Institute) can be accepted as a statistical pointer of safety performance of the industry relating to comprehension of occupational safety that must be given to workers at workplaces, the associated body of current Turkish laws stipulates some circumstances. According to the Turkish Regulation on Work Safety and Health, an employer must give workers with the required HS training and instructions about work activities, workplaces, potential hazards, defending and precautionary measures, and other personnel (Ulubeyli et al., 2014). This preparation must obtain principally when:

- Workers are newly employed.
- The workplace or work definition change.
- Work machines are altered.
- Working methods change. However, there seems to be an important difference between legislation and its execution in this regard.

In the field of occupational health and safety, Turkey has lawmaking, practical and institutional knowledge accumulated more than 150 years ago. The Ministry of Labor and Social Security (MoLLS) in collaboration with associated ministries and representatives of workforce take part in the key role in improving occupational safety and health in the country (Ergun, 2011).

When the occupational health and safety is considered in Turkish history; there seen a long and strong pathway from Ottoman Empire to first Grand Assembly and to Republic of Turkey. In the middle of the 19th century in the period of Ottoman Empire Sovereignty, "Dilaver Paşa Nizamnamesi" which was published in 1865 appeared as the first written regulation of Turkish occupational health and safety history. Although this Bylaw was not approved by the Emperor and could not entered in to force, with provisions such as physicians assignment obligation in the coal mines and improvements on working conditions this document which consists 100 articles shows us the importance given to health and safety by Turkish States. The second important

document after the administrative reforms was "Maadin Nizamnamesi" which was published in 1869. It was mostly based on provisions about occupational safety and had advanced and comprehensive approach than "Dilaver Paşa Nizamnamesi" (Ergun, 2011).

The industry of construction in Turkey similar to in numerous countries, can be described by its bad safety record. in spite of a enormous development in the associated statistics in the past two decades, it is still alarming. On average, the industry of construction is in charge for 9.9% of total employment injuries in the country, which means that there are two construction injuries per working hour. Of construction injuries, 5.2% result in everlasting incapacities. In other expressions, one construction worker loses his/her working capability every day. in the same way, the construction industry is in charge for 30.1% in occupational deaths in Turkey or, in other expressions, deaths constitute 4.2% of construction injuries. Both these values approximately correspond to one death per day. Turkey ranks 3rd country in the world in regard to occupational accidents and 1st country among EU countries in regard to occupational accidents resulting in fatality (Official Gazette, 2004).

Table 5.3: Work Accident in some activities in Turkey (MoLLS-Turkey)

Table 5.3 shows the work accidents in the construction industry in Turkey during years(2010-2014), for example 2023 people died in construction sector,1613 people died in mine field, and

Type of accident	2010	2011	2012	2013	2014	2010-2014
Construction	432	403	355	410	423	2023
Mine	301	284	278	364	386	1613
Agriculture	217	213	204	287	309	1230
Education	98	92	78	101	96	465

1230 people died in the field of Agriculture, while the work accidents for the same period time in north Cyprus that shown in Table 5.1 , are much less if compared with the fatal occurrence in Turkey, for example 269 people died in the construction field, 11 people died in mine field and 47 people died in the field of Agriculture, but in the both countries the most work accidents occurred in the field of construction during years (2010–2014), and it can be observes that there

is a huge difference in relation to occupational injuries and fatalities in the field of construction compared with the fatalities of other sectors.

5.3 Main Concepts of the Construction Safety Regulations and Measurements in EU

In the European Union, member states have enforcing authorities to guarantee that the fundamental legal necessities involving to occupational health and safety are met. In many EU countries, there is burly collaboration between employer and worker organizations to guarantee good OSH performance as it is known this has profits for both the worker (throughout preservation of health) and the enterprise (throughout improved productivity and quality). In 1996, the Agency of European for Safety and Health at Work was founded (European Directives, 2011).

The European Union Member states have all transposed into their national legislation a string of directives that set up minimum principles on occupational health and safety. These directives (of which there are about 20 on a diversity of topics) follow a similar structure requiring the employer to evaluate the workplace hazards and put in place precautionary measures based on a hierarchy of control. This hierarchy starts with removal of the hazard and ends with personal protective equipment (European Directives, 2011).

Nevertheless, confident EU member states confess to having deficient quality control in occupational safety services, to situations in which hazard analysis takes place without any on-site workplace visits and to unsatisfactory accomplishment of certain EU OSH directives. Depend on this, it is scarcely astonishing that the total societal costs of work-associated health problems and accidents be different from 2.6% to 3.8% of GNP between the European Union member states (European Directives, 2011).

In the majority countries males comprise the huge greater part of workplace fatalities. In the European Union as a whole, 94% of deaths were of males (Health & Safety Executive, 2014).

In the UK the disparity was even greater with males comprising 97.4% of workplace deaths. In the UK there were 171 fatal injuries at work in financial year 2011-2, compared with 651 in calendar year 1974, the fatal injury rate declined over that period from 2.9 fatalities per 100,000

workers to 0.6 per 100,000 workers, The Agency of European for Safety and Health at Work has confirmed that hundreds of workers have been killed and thousands of accidents have taken place in 3 days of absence from work site. The loss of these working days has resulted in massive harm being done to the European economy as a whole. This loss of working days yearly affects the economy of Europe in general (Health & Safety Executive, 2014).

5.3.1 UK

In the UK, health and safety legislation is drawn up and enforced by the Health and Safety Executive and local authorities (the local council) under the Health and Safety at Work etc. Act 1974 (Health and Safety Executive, 2009). The previous dependence on comprehensive prescriptive rule setting was seen as having unsuccessful to react quickly sufficient to technological change, leaving new technologies potentially unregulated or unsuitably regulated, HSE has persistent to create some regulations giving complete responsibilities (where something must be done with no rational practicability test) but in the UK the regulatory trend is absent from prescriptive rules, and towards goal setting and hazard appraisal. Current chief changes to the laws governing asbestos and fire safety management embrace the idea of hazard appraisal (Health and Safety at work, 2014).

5.3.2 Australia

In Australia, the Commonwealth, four of the six states and both territories has enacted and administers coordinated Work Safety Legislation in harmony with the Intergovernmental concord for Regulatory and Operational improvement in Occupational Health and Safety. Each jurisdiction with a model Work Safety and Health Act and model Work Health and Safety Law is set up on the Model WHS Regulations and general Codes of Practice developed by Safe Work Australia. Some jurisdictions have also involved mine safety beneath the model approach; nevertheless, most have retained separate legislation for the time being. Western Australia intends to espouse a moderated edition of the model idea and Victoria has retained its own regime, even though the Model WHS Regulations themselves drew greatly on the approach of Victoria (Safe Work Australia, 2011).

5.3.3 Sweden

In Sweden, occupational safety and health is regulated by the Work Environment Act. The Swedish Work Environment Authority is the government agency in charge for issues associating to the working environment. The agency should work to distribute information and provide recommendation on OSH, has a mandate to do inspections, and a right to issue conditions and injunctions to any non-compliant employer (Swedish Work Environment Authority, 2014).

5.3.4 German

The construction sector in Germany is one of the country's most important economic sectors. The industry provides jobs to approximately 2.4 million people. With a share of more than one fifth, the German construction sector is the largest in the EU-28 in terms of building investments. The building trades have a long tradition and play an important role in developing innovative services. This is one of the reasons why Germany is among the world's leading exporters of construction and planning services. The industry is closely connected to the building material and machine manufacturer sectors (Marcussen, 1999).

CHAPTER 6

MAIN DIFFERENCES IN BETWEEN THE CONCEPTS OF THE CONSTRUCTION SAFETY REGULATIONS MEASUREMENTS OF TRNC, REPUBLIC OF TURKEY AND EU

The OSH regulations of TRNC are based on the EU Standards, In Northern Cyprus, employers are responsible from OSH and the Labor office is responsible for implementation, and the most accidents occur in the construction and followed by the production industry. The accidents are due to the reality that sufficient security measures are not taken. Although the Occupational Health and Safety Law were accepted by the parliament in 2009, it is not yet implemented. In the Turkish Republic of Northern Cyprus(TRNC)work accidents in the field of the construction industry caused in losing yearly 3000 days from 1997 to 2006 (Çelikağ, 2008).

In Figure 6.1, the available data for work-related accidents in the Turkish Republic of Northern Cyprus only cover the years 2006-2009. As the numbers injured were less than 100,000, a proportional system was used in the calculations. There was an increase in 2007 and the figure shows a decrease in 2008. There was an overall fall of about 5% over the 4 years in the accident occurrence which is less than that documented in either Turkey or the EU.

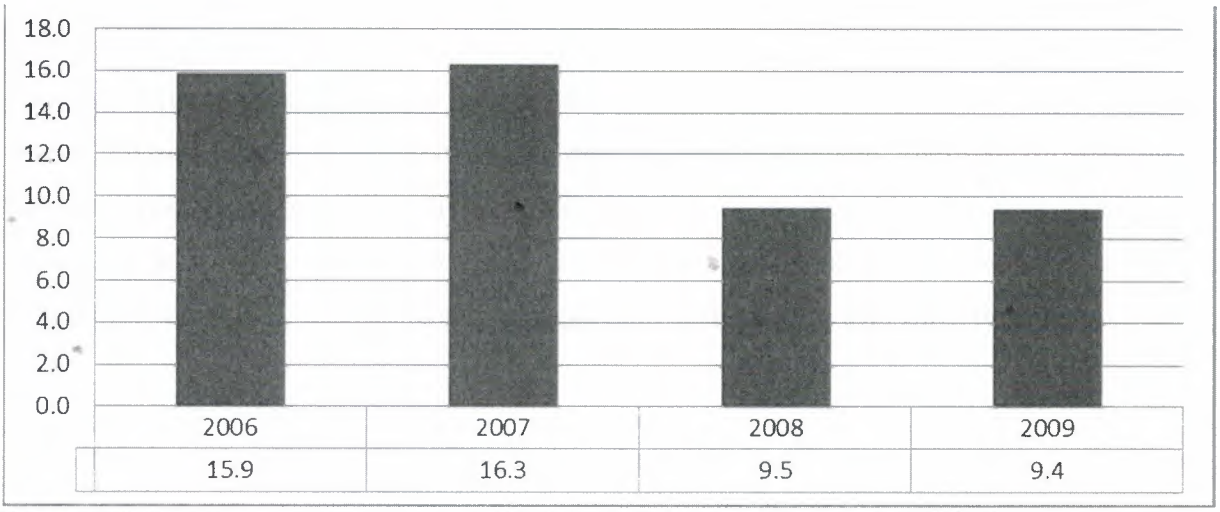

Figure 6.1: Incidence of fatal work accidents per 100,000 workers in the TRNC according to the Ministry of Labor and Social Security (ÇSGB, 2011)

As shown in Figure 6.1, there was a 41% reduction in the rate of fatal accidents within the time frame 2006 to 2009. In the TRNC and Turkey, the rate of non-fatal accidents is much less than the rate observed in the EU. But the opposite is true of the occurrence of fatal accidents. For example, the number of non-fatal accidents in 2006 was 1,953 per 100,000 employees in the European countries while it was 1,011 Turkey and 426 in TRNC. However, concerning fatal accidents for the same year, it can be observed from Figure6.1, Figure6.2, and figure6-3 the fatal incident rate in EU is 2.8 while in Turkey is 20 and in TRNC is 15.9. The major causes of accidents at work in the TRNC are falling from heights, onsite accidents involving vehicles and moving objects from one place to another.

According to the data by the Labor Department of the Ministry of Labor and Social Security, A total of 18 workers died in 714 work accidents in the last three years in TRNC, 696 workers were injured and Seven out of 18 deaths happened in the construction sector, The data reveals that 6 fatal accidents between 2011-2013 happened by (falling from a high place), 5 happened by (exposure to excess heat, electricity, chemicals, sharp object), 2 by (slides or collapses), 2 by (being hit by a falling object), 2 by a (traffic accident), 1 by (natural causes),So it's obviously these data shows that most of the fatal work accidents occurred in the construction sector. (Güler, 2014).

In recent years, legislation of occupational health and safety improved by harmonizing with EU but implementation is inadequate. Although big companies have problems for implementing OSH standards, SMEs are unable to take the responsibility for occupational injuries because several reasons. The biggest problem for occupational health and safety is because of the subcontracting. According to the Turkish Regulation on Work Health and Safety, an employer must provide workers with the required HS training and instructions about work activities, workplaces, potential risks, protective and preventive measures, and other personnel (Yilmaz, 2015).

Half of serious accidents occurred in Turkey due to lack of attention, dangerous behaviors, disregarding the occupational safety rules, misapplying the rules of working at height, disusing of the lifting vehicles and hand tools, which have a high potential for accidents, lack of maintenance and control of the equipment, lack of experts, technical staffs, inspections and trainings (Yilmaz, 2015).

However, occupational accident statistics in Turkey are far from the truth due to sweeping the events under the carpet, informality, unregistered worker. Besides, public officers working in construction sites are not taken into account in the statistics since they are not considered as workers. Moreover, the enterprises aren't attentive to keep proper records and being a part of statistics analysis. Thus, the total financial losses can't be calculated in many enterprises (Yilmaz, 2015).

In Figure 6.2 also, work related fatal accidents statistics in Turkey show that there are variations. The number of accidents occurring at work was much less than that of the EU over the same time period but was higher than the EU countries surveyed in terms of fatality. The years 1997-2006 witnessed an average yearly fatality rate of about 18 per 100,000 employees. In general, an increase in 2006 has been shown (OSHA, 2010).

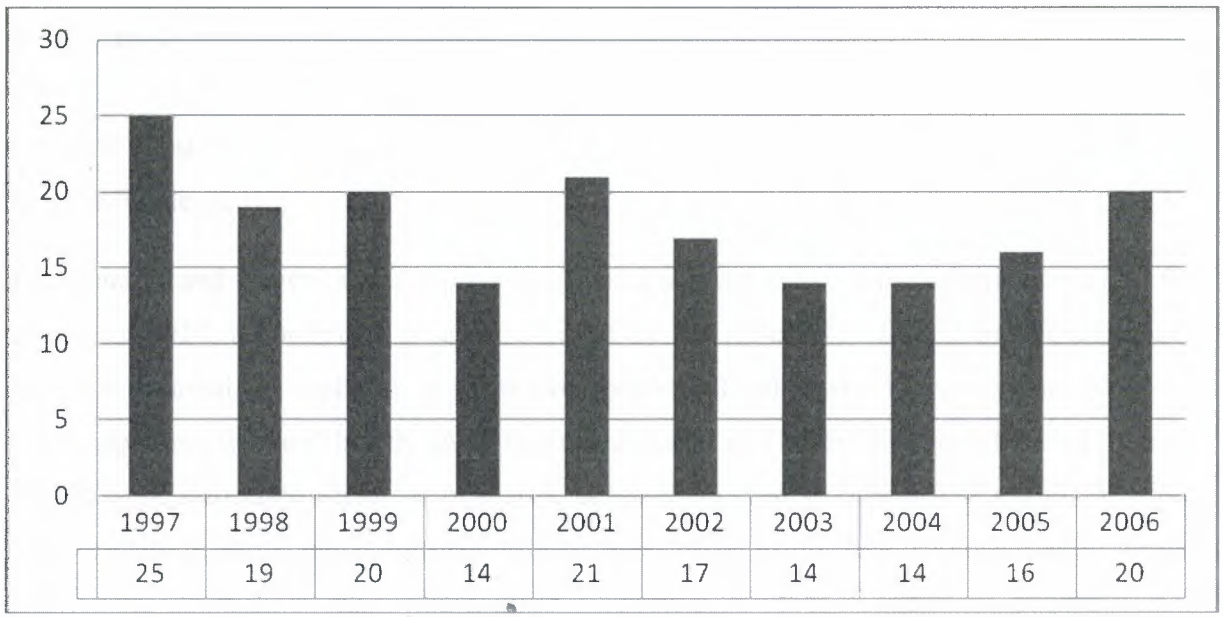

Figure 6.2: Incidence of work fatal accidents per 100,000 workers in Turkey according to the Turkish Social Insurance Agency (EU-OSHA, 2008)

127 accidents were occurred in 1 year period from February 2012-January 2013 at the construction site which conducted the survey. Including full-time and temporary workers, workers have done 869760 working hours totally in site. Occupational accidents incidence rate is calculated as 6.5 per 100 worker (or 6500 per 100000 worker) in site by using Social Security Institute calculation method (127 / 869760 / 225.000). The occupational accident incidence rate

is 0.55 for all sectors in Turkey in 2012. According to the survey results, construction occupational accidents incidence rate is more than 10 times to other sectors in Republic of Turkey. According to data excused by the Ministry of Labor and Social Security in 2013, 172 accidents of work occur every day in Turkey. Ministry officials say employers and workers are now receiving safety of work instruction to reduce accidents. The ministry of labor and social security estimates the overall yearly cost of accidents of work in Republic of Turkey at TL 7.7 billion. According to statistics excused by the Eskişehir Center of Work Development (ESİŞGEM) in May of 2013, one employee dies every six hours in Republic of Turkey (Güneş, 2013).

Turkey has seen a increase in the numeral of these victims. The Assembly's annual report of Workers' Health and Job Safety in Istanbul for 2013 showed 1,235 died in work associated incidents in Republic of Turkey that year, and 13 children died in work associated accidents in the first three months of 2014. Six (6) of these were below 15 years old and seven (7) of them were 15-17 years old. Furthermore, 25 workers 51years old and older died in the same time on the work, Most of the accidents of work occurred in the Mersin provinces, Istanbul, Kars as well as Izmir (Güneş, 2013).

Two hundred and seventy six (276) employees died in work associated accidents in the first three months of 2014, according to a report excused by the Assembly of Workers' Health and Job Safety in Istanbul, As millions of employees celebrated Labor and Solidarity Day on May 1, work safety and workers' health stay a neglected matter in Turkey. The report showed that 112 died in work associated accidents in March, although 77 died in February as well as 87 died in January. The majority work associated deaths take place in the field of construction, mining, trade as well as agriculture sectors, the report showed that Twenty five (25) construction employees died in the first three months of 2014, fourteen (14) of the deaths were the caused by falls. The report as well made special point out of claims that authorities reserved silent on the subject of the worker's death throughout the construction of a new complex for the Ministry of Prime on the same daytime a court reversed a choice by the Reserves Commission of Ankara Regional Natural to decrease the level of security of the well-known Ankara forest where the compound was being built, successfully halting structure construction (Güneş, 2013).

In that report the head Architects Chamber in Ankara Tezcan Karakuş Candan's explained at a press conference on March that Savaş Oğuz died after falling down at the construction site from a scaffold, but that death situation had not been reported to the community, According to reports excused by the Statistics Institute of Turkish (Turk Stat), the field of construction is ranked first in work associated accidents, with four absent of each 100 construction employees suffering a work correlated accident every year, In a press discharge in late March, Precast and Scaffold Systems Manufacturers organization (KALİSDER) President Serdar Urfalılar explained that 43% of fatal job accidents and 33% of accidents relating wound in the field of construction were the outcome of falls. The president added that raising the custom of formwork as well as scaffolding systems would drastically decrease the job interconnected hazards as well as risks of working in the field of construction (Güneş , 2013). In numerous European Union countries, there is burly cooperation between employer and employee organizations (e.g. unions) to make certain good OSH act as it is known this has profit for both the employee (throughout preservation of health) as well as the enterprise (throughout improved efficiency also quality). Nevertheless, positive European Union member states confess to having deficient quality control in job correlated safety services, to situations in which hazard analysis occur without any on site place of work visits moreover to inadequate execution of certain European Union Occupational safety and Health (OSH) directives. Regarding on this, it is barely astonishing that the total communal costs of job-related health troubles and accidents differ from 2.6% to 3.8% of GNP between the European Union member states (Güneş , 2013).

The Agency of European for Safety and Health at Work (2007) states that there have been 4.5 million accidents and more than 5,550 deaths annually. Figures like these mean that EU countries lose approximately 146 million working days yearly. This massive number of working days lost will cost the economy of EU countries only about 20 billion Euro (Eurofound, 2007).It is noted also that in the United Kingdom alone more than 1.3 million people have suffered work-related injuries in 2009(HSE, 2009).

Occupational accidents incidence rate is 1614 per 100 000 worker in EU. Incidence rate calculated as 2085 in Germany, 2807 in Portugal, 2373 in France, 1851 in Holland, 1810 in Austria and 891 in UK, respectively .Occupational accident frequency rates are high in the construction sector in all countries relatively. However, Turkey's situation is much worse than

the all European countries. It is evident from the Figure 6.3 below that there was a significant decline in the rate of work-related accidents in EU countries between 1996 and 2007. It is clearly shown that there was a significant decrease of about 40% per 100,000 employees over the 10 year period. The time between 2001 and 2002 witnessed the highest decrease of about 13%. During those ten years, 3,490 less were recorded per 100,000 persons. The year 1996 represents the highest rate of accident incidence for 100,000 employees at 18.013%.

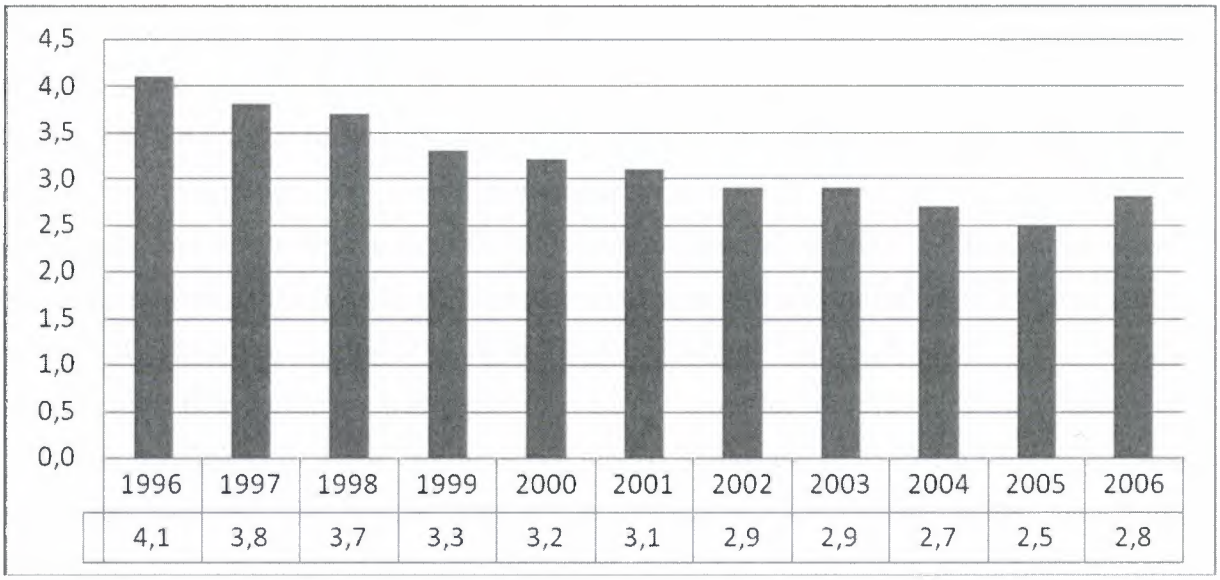

Figure 6.3: Incidence of work fatal accidents in per 100,000 workers 15 EU countries (Eurostat, 2010)

From 1996 to 2006 in Figure 6.3, the reduction in the rates of fatal accidents can be noticed. In ten years in Turkey, there is 50% drop. But the rate varies in this period of time. For example, it witnessed an important drop in 2002, and then in 2005 after being stable for more than 3 years as shown in Figure 6.2 (Stavrou, 2010; Çelikağ, 2008).

CHAPTER 7

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusion

Construction is one of the most hazardous occupations in the world, incurring more work-related fatalities than any other field in the North Cyprus, United States , European Union, and Turkish republic. Most of serious accidents occur in construction field in the world and especially in Turkey and TRNC due to lack of attention, dangerous behaviors, disregarding the occupational safety rules, misapplying the rules of working at height, lack of maintenance and control of the equipment, lack of experts, technical staffs, inspections and trainings. The major cause of accidents at work in the TRNC are falling from heights this research obviously shows that The number of accidents occurring at work in TRNC and turkey was much less than that of the EU over the same time period but was higher than the EU countries surveyed in terms of fatality.
The OSH regulations of TRNC are based on the EU Standards, In Northern Cyprus, employers are responsible from OSH and the Labor office is responsible for implementation, and in turkey, in recent years, legislation of occupational health and safety improved by harmonizing with EU but implementation is inadequate.

In such countries like North Cyprus with rapid economic growth and associated industrial growth, it is essential that there is more attention given to worker safety and health in order to prevent irreversible consequences of occupational injury.

It can be observed that there is no real Health and Safety expert supervision on construction sites and The fatalities or injuries among human resources on construction sites will lead to various types of negative effects, Therefore, it is important to have an investigation and develop health and safety plan program in order to reduce the injuries and fatalities by training the new generation of engineers or workers on construction sites, and reach a general health and safety plan for the most critical activities of construction projects.

There is a lack of safety and health training programs in the majority of the companies. Informal briefings are generally used instead of formal training programs. Poor attitude toward safety,

unsafe site conditions and lack of knowledge and safety training are the most important factors causing accidents.

On the existing safety procedures, regulations, policies, and accidents prevention methods related to the construction projects; there is a consensus among the respondents that implementation of safety regulation helps in reducing accidents. Construction professionals should play more active roles in sustaining construction safety and in improving safety culture for construction workers. There is also a consensus between the respondents that responsibility for safety and health was only confined to construction work on site.

This study based on these injuries and fatalities that happened in construction shows that OSH training is not regularly applied by all companies resulting in several types of occupational illnesses and injuries based on . In order to protect employees from those illnesses and injuries, employer should train their employees well and those trainings should be offered periodically. Repetitive activities can lead to repetitive strain injuries. Employees working at the same job for a long time got used to their aches and pains and do not consider them as a problem anymore. In the woodworking industry employees were confronted with too much dust, and did not use any PPE. As a result, some employees are suffering from visual and skin problems. Training regarding with load carried by employees is inadequate resulting in employees with back, shoulder, neck and muscle pains. Furthermore, machines and other equipments used in the work places have no warning signs. Also, some employers do not provide written instruction about the machines and equipment used, As a result, employees are confronted vibration; getting their hand or finger to the machines, finger cuts and other more serious occupational injuries or diseases. Especially at construction sites, it is observed that approximately all of the employees did not use any PPE even though they reported that they did. Employees also reported the presence of a workplace first aid room and emergency exit doors, On site observations did not confirm this. Most companies did not have a first aid room; some companies have a first aid bag; there are no specific emergency exit doors. Employees felt that their work environment was such that they could easily go out in the case of emergency. Observations during construction sites also revealed the lack of appropriate signage and warnings, lack of protective gear for fall prevention, foot protectors, seat belts or safety ropes. In addition, employees fail to protect themselves from harmful levels of noise and dust.

In the construction industry, uninsured employees are another important barrier to safe working circumstances at construction field. Insured employees are not free from Health and Safety problems, either. There are big irregularities in their insurance premiums, which their employers must pay each month. These two troubles in the industry most likely lead to employee's lack of concentration on occupation, which makes workers suffering to accidents.

The fact that rests, except for lunch rests, are not permitted at construction sites may increase the hazard level. Nevertheless, it is interesting that some workers think accidents to be normal anomalies at construction sites in spite of that truth that numerous of them have either suffered from wounds or witnessed occupational accidents in the past. Regarding Personal Protective Equipment (PPE) as well as construction safety, mutually contractors and employees pay attention to procuring and wearing some articles like a hard hat, reflector vest, gloves, as well as boots/shoes. Nevertheless, neither contractors nor employees join much significance to a harness, goggles, helmet, or earplugs.

Consequently, in a working environment with deficiencies in the quantity as well as quality of outside control techniques, like unions and administration inspectors, it is obvious that contractors will be inclined to ignore their legal duties of paying employers' insurance premiums. Raising the numeral of administration inspectors may be a short expression vital solution to this trouble. Contractors have several responsibility, there should apply interior self control systems in the form of place inspectors as well as managers. In this situation, they should carry out their projects in a way that complies with Health and Safety regulations. A number of them are free cost actions like providing safety training as well as allowing some rests at job. on the other hand, when essential, they should not think about investments on Personal protective equipment and hiring physicians additional cost objects in the construction development. if not, in case of occupational accidents, they will probable skill big economic losses because of extended delays as well as official criminal penalties. Lastly, employees have numerous duties in maintaining a healthy and safe operational environment, as well. They should concentrate work-related training programs to learn the necessities of their own trades in detail. More significantly, whatever their influence, they should continually utilize all Personal protective equipment (PPE) provided by their workers to take care of themselves at construction sites.

Unsafe site conditions can significantly increase the possibility of construction accidents. Thus, companies also have to control site conditions regularly in order to prevent possible accidents. It

is obvious that all parties involved in a construction project should be concerned with the safety regulations to obtain a better safety performance.

7.2 Recommendations

In order to address the above mentioned OSH issues and improve the working conditions for employees decreasing the number of workers suffering from occupational disease in TRNC, it can be make the following recommendations:

- There is lack knowledge and attention regarding to Safety and Health Regulations in TRNC so that there should be specific trainings offered to Companies of all industries such as employment OSH training and training of employers.

- The ministry of labor and social insurance of North Cyprus through the Engineering control should do some site visits and evaluate the applying the OSH Regulations in the construction sector in order to understand the current OSH situation and determine any violation of OSH regulations.

- The ministry of labor and social insurance of North Cyprus through Engineering controls should monitor and inspect workplaces and direct the construction companies to apply the OSH regulations, especially the rules of working at height and Personal Protective Equipments such as safety glass, hard hat, safety shoes and gloves.

- There is a poor supervision at construction field in TRNC and it is the main reason which is responsible for the accident occurrence, therefore the construction companies need to increase the quality and quantity of safety and health supervisors.

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APPENDICES

APPENDIX 1

CONSTRUCTION SAFETY REGULATIONS IN EUROPEAN UNION

Article 13

SAFETY OF WORKPLACES

1. All appropriate precautions shall be taken to ensure that all workplaces are safe and without risk of injury to the safety and health of workers.
2. Safe means of access to and egress from all workplaces shall be provided and maintained, and indicated where appropriate.
3. All appropriate precautions shall be taken to protect persons present at or in the vicinity of a construction site from all risks which may arise from such site.

Article 14

SCAFFOLDS AND LADDERS

1. Where work cannot safely be done on or from the ground or from part of a building or other permanent structure, a safe and suitable scaffold shall be provided and maintained, or other equally safe and suitable provision shall be made.
2. In the absence of alternative safe means of access to elevated working places, suitable and sound ladders shall be provided. They shall be property secured against inadvertent movement.
3. All scaffolds and ladders shall be constructed and used in accordance with national laws and regulations.
4. Scaffolds shall be inspected by a competent person in such cases and at such times as shall be prescribed by national laws or regulations.

Article 18

WORK AT HEIGHTS INCLUDING ROOFWORK

1. Where necessary to guard against danger, or where the height of a structure or its slope exceeds that prescribed by national laws or regulations, preventive measures shall be taken against the fall of workers and tools or other objects or materials.
2. Where workers are required to work on or near roofs or other places covered with fragile material, through which they are liable to fall, preventive measures shall be taken against their inadvertently stepping on or falling through the fragile material.

Article 19

EXCAVATIONS, SHAFTS, EARTHWORKS, UNDERGROUND WORKS AND TUNNELS

Adequate precautions shall be taken in any excavation, shaft, earthworks, underground works or tunnel-

a) by suitable shoring or otherwise to guard against danger to workers from a fall or dislodgement of earth, rock or other material;
b) to guard against dangers arising from the fall of persons, materials or objects or the inrush of water into the excavation, shaft, earthworks, underground works or tunnel;
c) to secure adequate ventilation at every workplace so as to maintain an atmosphere fit for respiration and to limit any fumes, gases, vapours, dust or other impurities to levels which are not dangerous or injurious to health and are within limits laid down by national laws or regulations;
d) to enable the workers to reach safety in the event of fire, or an inrush of water or material;
e) to avoid risk to workers arising from possible underground dangers such as the circulation of fluids or the presence of pockets of gas, by undertaking appropriate investigations to locate them.

Article 29

FIRE PRECAUTIONS

1. The employer shall take all appropriate measures to-

    a) avoid the risk of fire;
    b) combat quickly and efficiently any outbreak of fire;
    c) bring about a quick and safe evacuation of persons.

2. Sufficient and suitable storage shall be provided for flammable liquids, solids and gases.

Article 30

PERSONAL PROTECTIVE EQUIPMENT AND PROTECTIVE CLOTHING

1. Where adequate protection against risk of accident or injury to health, including exposure to adverse conditions, cannot be ensured by other means, suitable personal protective equipment and protective clothing, having regard to the type of work and risks, shall be provided and maintained by the employer, without cost to the workers, as may be prescribed by national laws or regulations.
2. The employer shall provide the workers with the appropriate means to enable them to use the individual protective equipment, and shall ensure its proper use.
3. Protective equipment and protective clothing shall comply with standards set by the competent authority taking into account as far as possible ergonomic principles.
4. Workers shall be required to make proper use of and to take good care of the personal protective equipment and protective clothing provided for their use.

Article 31

FIRST AID

The employer shall be responsible for ensuring that first aid, including trained personnel, is available at all times. Arrangements shall be made for ensuring the removal for medical attention of workers who have suffered an accident or sudden illness.

APPENDIX 2

CONSTRUCTION SAFETY REGULATIONS IN USA

Medical and first aid

First aid and medical attention – Division 3, Subdivision C, 1926.23

First-aid services and provisions for medical care must be made available by the employer for every employee covered by these requirements.

Medical services and first aid – Division 3, Subdivision D, 1926.50

Key requirements:

- The employer must ensure the availability of medical personnel for advice and consultation on matters of occupational health.
- Provisions must be made for prompt medical attention in case of serious injury before commencement of a project.
- In the absence of an infirmary, clinic, hospital, or physician reasonably accessible to the worksite, a person who has a valid certificate in first-aid training from the U.S. Bureau of Mines, the American Red Cross, or equivalent training, must be available at the site to render first aid.
- First-aid supplies must be easily accessible when required. The contents of the first-aid kit must be placed in a weatherproof container with individual sealed packages for each type of item, and must be checked by the employer before being sent out on each job and at least weekly on each job to ensure that the expended items are replaced.
- Proper equipment for prompt transportation of the injured person to a physician or hospital, or a communication system for contacting necessary ambulance service, must be provided.
- Where 911 services are not available, the phone numbers of the physicians, hospitals, or ambulances must be conspicuously posted.

Subpart L - Scaffolds

§ 1926.451 - General requirements.

- Scaffold must be sound, rigid and sufficient to carry its own weight plus four times the maximum intended load without settling or displacement. It must be erected on solid footing.
- Unstable objects, such as barrels, boxes, loose bricks or concrete blocks must not be used to support scaffolds or planks.
- Scaffold must not be erected, moved, dismantled or altered except under the supervision of a competent person.
- Scaffold must be equipped with guardrails, midrails and toeboards.
- Scaffold accessories such as braces, brackets, trusses, screw legs or ladders that are damaged or weakened from any cause must be immediately repaired or replaced.
- Scaffold platforms must be tightly planked with scaffold plank grade material or equivalent.
- A "competent person" must inspect the scaffolding and, at designated intervals, reinspect it.
- Rigging on suspension scaffolds must be inspected by a competent person before each shift and after any occurrence that could affect structural integrity to ensure that all connections are tight and that no damage to the rigging has occurred since its last use.
- Synthetic and natural rope used in suspension scaffolding must be protected from heat-producing sources.
- Employees must be instructed about the hazards of using diagonal braces as fall protection.
- Scaffold can be accessed by using ladders and stairwells.
- Scaffolds must be at least 10 feet from electric power lines at all times.

Subpart M - Fall Protection

§ 1926.501 – General Requirements for fall protection.

Each year, falls consistently account for the greatest number of fatalities in the construction industry. A number of factors are often involved in falls, including unstable working surfaces, misuse or failure to use fall protection equipment and human error. Studies have shown that using guardrails, fall arrest systems, safety nets, covers and restraint systems can prevent many deaths and injuries from falls, therefore shall follow;

- Consider using aerial lifts or elevated platforms to provide safer elevated working surfaces;
- Erect guardrail systems with toeboards and warning lines or install control line systems to protect workers near the edges of floors and roofs;
- Cover floor holes; and/or
- Use safety net systems or personal fall arrest systems (body harnesses).

Subpart X - Stairways and Ladders

§ 1926.1051 - General requirements.

Ladders

the Employer shall;

- Use the correct ladder for the task.
- Have a competent person visually inspect a ladder before use for any defects such as:
  - Structural damage, split/bent side rails, broken or missing rungs/steps/cleats and missing or damaged safety devices;
  - Grease, dirt or other contaminants that could cause slips or falls;
  - Paint or stickers (except warning labels) that could hide possible defects.
- Make sure that ladders are long enough to safely reach the work area.
- Mark or tag ("Do Not Use") damaged or defective ladders for repair or replacement, or destroy them immediately.

- Never load ladders beyond the maximum intended load or beyond the manufacturer's rated capacity.
- Be sure the load rating can support the weight of the user, including materials and tools.
- Avoid using ladders with metallic components near electrical work and overhead power lines.

Stairways

Slips, trips and falls on stairways are a major source of injuries and fatalities among construction workers, therefore shall follow;

- Stairway treads and walkways must be free of dangerous objects, debris and materials.
- Slippery conditions on stairways and walkways must be corrected immediately.
- Make sure that treads cover the entire step and landing.
- Stairways having four or more risers or rising more than 30 inches must have at least one handrail.

Subpart P – Excavations and Trenching

§ 1926.651 - General requirements.

Trench collapses cause dozens of fatalities and hundreds of injuries each year., therefore shall follow;

- Never enter an unprotected trench.
- Always use a protective system for trenches 5 feet deep or greater.
- Employ a registered professional engineer to design a protective system for trenches 20 feet deep or greater.
- Protective Systems:

  Sloping to protect workers by cutting back the trench wall at an angle inclined away from the excavation not steeper than a height/depth ratio of $_{1/2}:_{1}$, according to the sloping requirements for the type of soil.

SLOPING. Maximum allowable slopes for excavations less than 20 ft. (6.09 m) based on soil type and angle to the horizontal are as follows:

TABLE V:2-1. ALLOWABLE SLOPES

Soil type	Height/Depth ratio	Slope angle
Stable Rock (granite or sandstone)	Vertical	90°
Type A (clay)	3/4 :1	53°
Type B (gravel, silt)	1:1	45°
Type C (sand)	1/2:1	34°
Type A (short-term) (For a maximum excavation depth of 12 ft.)	12:1	63°

- ❖ Shoring to protect workers by installing supports to prevent soil movement for trenches that do not exceed 20 feet in depth.
- ❖ Shielding to protect workers by using trench boxes or other types of supports to prevent soil caveins.

➢ Always provide a way to exit a trench—such as a ladder, stairway or ramp--no more than 25 feet of lateral travel for employees in the trench.

- Keep spoils at least two feet back from the edge of a trench.
- Make sure that trenches are inspected by a competent person prior to entry and after any hazard-increasing event such as a rainstorm, vibrations or excessive surcharge loads.

Subpart E – Personal Protective and Life Saving Equipment

§ 1926.102 - Eye and face protection.

- Safety glasses or face shields are worn anytime work operations can cause foreign objects getting into the eye such as during welding, cutting, grinding, nailing (or when working with concrete and/or harmful chemicals or when exposed to flying particles).
- Eye and face protectors are selected based on anticipated hazards.
- Safety glasses or face shields are worn when exposed to any electrical hazards including work on energized electrical systems.

§ 1926.96 - Occupational foot protection.

- Construction workers should wear work shoes or boots with slip-resistant and puncture-resistant soles.
- Safety-toed footwear is worn to prevent crushed toes when working around heavy equipment or falling objects.

§ 1926.101 - Hearing protection.

- Gloves should fit snugly.
- Workers wear the right gloves for the job (for example, heavy-duty rubber gloves for concrete work, welding gloves for welding, insulated gloves and sleeves when exposed to electrical hazards).

§ 1926.100 - Head protection.

- Workers shall wear hard hats where there is a potential for objects falling from above, bumps to their heads from fixed objects, or of accidental head contact with electrical hazards.
- Hard hats are routinely inspected for dents, cracks or deterioration.
- Hard hats are replaced after a heavy blow or electrical shock.
- Hard hats are maintained in good condition.

APPENDIX 3

CONSTRUCTION SAFETY REGULATIONS IN TURKEY

III. PREVENTIVE AND PROTECTIVE MEASURES

Article 13

SAFETY OF WORKPLACES

- 1. All appropriate precautions shall be taken to ensure that all workplaces are safe and without risk of injury to the safety and health of workers.
- 2. Safe means of access to and egress from all workplaces shall be provided and maintained, and indicated where appropriate.
- 3. All appropriate precautions shall be taken to protect persons present at or in the vicinity of a construction site from all risks which may arise from such site.

Article 14

SCAFFOLDS AND LADDERS

- 1. Where work cannot safely be done on or from the ground or from part of a building or other permanent structure, a safe and suitable scaffold shall be provided and maintained, or other equally safe and suitable provision shall be made.
- 2. In the absence of alternative safe means of access to elevated working places, suitable and sound ladders shall be provided. They shall be property secured against inadvertent movement.
- 3. All scaffolds and ladders shall be constructed and used in accordance with national laws and regulations.
- 4. Scaffolds shall be inspected by a competent person in such cases and at such times as shall be prescribed by national laws or regulations.

TRAINING OF WORKERS

ARTICLE 17 –

(1) The employer shall ensure that each worker receives safety and health training. This training shall be provided on recruitment, in the event of a transfer or a change of job, in the event of a change in equipment or introduction of any new technology. The training shall be adapted to take account of new or changed risks and repeated periodically if

necessary.

(2) Workers' representatives shall be entitled to appropriate training.

(3) Workers failing to present documents to prove that they have received vocational training on their job might not be employed in jobs classified as hazardous and very hazardous which require vocational training.

(4) Workers who have had occupational accident or disease shall receive additional training on reasons for the accident or disease, ways to protect themselves and safe working methods. Furthermore; workers who are away from work for any reason for more than six months shall receive refresher training before return to work.

(5) Workers from outside undertakings and/or enterprises might not start to be employed in jobs classified as hazardous and very hazardous unless they can present documents to prove that they have received appropriate instructions regarding health and safety risks.

(6) The employer who is the party to temporary employment relationship shall ensure that the worker receives training on health and safety risks.

(7) Trainings mentioned in this article may in no circumstances bring financial burden to workers. Time spent on trainings shall be deemed as actual work time. In case the time allocated for trainings exceeds weekly working hours, hours worked in excess of weekly working hours shall be considered as overtime.

Article 19

EXCAVATIONS, SHAFTS, EARTHWORKS, UNDERGROUND WORKS AND TUNNELS

Adequate precautions shall be taken in any excavation, shaft, earthworks, underground works or tunnel-

- (a) by suitable shoring or otherwise to guard against danger to workers from a fall or dislodgement of earth, rock or other material;

- (b) to guard against dangers arising from the fall of persons, materials or objects or the inrush of water into the excavation, shaft, earthworks, underground works or tunnel;
- (c) to secure adequate ventilation at every workplace so as to maintain an atmosphere fit for respiration and to limit any fumes, gases, vapours, dust or other impurities to levels which are not dangerous or injurious to health and are within limits laid down by national laws or regulations;
- (d) to enable the workers to reach safety in the event of fire, or an inrush of water or material;
- (e) to avoid risk to workers arising from possible underground dangers such as the circulation of fluids or the presence of pockets of gas, by undertaking appropriate investigations to locate them.

Article 30

PERSONAL PROTECTIVE EQUIPMENT AND PROTECTIVE CLOTHING

- 1. Where adequate protection against risk of accident or injury to health, including exposure to adverse conditions, cannot be ensured by other means, suitable personal protective equipment and protective clothing, having regard to the type of work and risks, shall be provided and maintained by the employer, without cost to the workers, as may be prescribed by national laws or regulations.
- 2. The employer shall provide the workers with the appropriate means to enable them to use the individual protective equipment, and shall ensure its proper use.
- 3. Protective equipment and protective clothing shall comply with standards set by the competent authority taking into account as far as possible ergonomic principles.
- 4. Workers shall be required to make proper use of and to take good care of the personal protective equipment and protective clothing provided for their use.

Article 31

FIRST AID

The employer shall be responsible for ensuring that first aid, including trained personnel, is available at all times. Arrangements shall be made for ensuring the removal for medical attention of workers who have suffered an accident or sudden illness.

Article 32

WELFARE

- 1. At or within reasonable access of every construction site an adequate supply of wholesome drinking water shall be provided.
- 2. At or within reasonable access of every construction site, the following facilities shall, depending on the number of workers and the duration of the work, be provided and maintained-
  - (a) sanitary and washing facilities;
  - (b) facilities for changing and for the storage and drying of clothing;
  - (c) accommodation for taking meals and for taking shelter during interruption of work due to adverse weather conditions.
- 3. Men and women workers should be provided with separate sanitary and washing facilities.

Article 33

INFORMATION AND TRAINING

Workers shall be adequately and suitably-

- (a) informed of potential safety and health hazards to which they may be exposed at their workplace;
- (b) instructed and trained in the measures available for the prevention and control of, and protection against, those hazards.

Emergency plans, fire-fighting and first aid

ARTICLE 11 –

(1) The employer shall;

a) assess the foreseeable emergency situations which could arise and identify those that might possibly and potentially affect workers and work environment taking into account the work environment, substances used, equipment and environmental conditions present in the workplace and take measures to prevent and limit adverse effects of emergency situations.

b) Conduct measurement and assessments to afford protection against adverse effects of emergency situations and prepare emergency plans.

c) designate a sufficient amount of persons adequately equipped in prevention, protection, evacuation, fire fighting, first aid and other related issues taking into account the size and specific hazards of the undertaking, nature of the activities, number of employees and other persons present in the enterprise. The number of such workers, their training and equipment available to them shall be adequate and the employer shall arrange emergency drills and trainings and make sure that the rescue teams are always available to respond.

d) Arrange any necessary contacts with external services, particularly as regards first aid, emergency medical care, rescue work and fire-fighting.

APPENDIX 4a

ÇALIŞMA DAİRESİ MÜDÜRLÜĞÜ'NÜN UYGULANMASINDAN SORUMLU OLDUĞU YASA, TÜZÜK VE YÖNETMELİKLER

I- Çalışma Dairesi'nin Uygulanmasından Doğrudan Sorumlu Olduğu Yasa, Tüzük ve Yönetmelikler

A. Çalışma Dairesi (Kuruluş, Görev ve Çalışma Esasları) Yasası (35/2000)

i. Tüzük

1. Çalışma ve Sosyal Güvenlik Danışma Meclisinin Oluşumu, Toplanması ve Çalışma Esasları Tüzüğü (A.E.:327 17.6.2004)
2. Çalışma ve Sosyal Güvenlik Danışma Meclisi Toplantısı ile Çalışma Usul ve Esasları Yönetmeliği (A.E.:652 15.12.2011)

B. İş Yasası (22/1992)

i. Tüzükler

1. İşgücü Planlama ve Geliştirme Merkezi Tüzüğü (A.E.:284 01.07.1992)
2. Basınçlı Kaplar Denetim Tüzüğü (A.E.:528 10.12.1992)
3. Kaldırma Cihazları ve Aksamları Denetim Tüzüğü (A.E.:527 10.12.1992)
4. Asansörler Denetim Tüzüğü (A.E.:280 15.06.1993)
5. İnşaatlarda İşçi Sağlığı ve İş Güvenliği Tüzüğü (A.E:426 08.08.1998)
6. Genç Kişilerin İstihdamıTüzüğü (A.E.:563 26.09.2002)
7. İşverenlerin İşçi İstemlerini Çalışma Dairesi'ne Bildirmeleri Tüzüğü (A.E.:115.02.1995)

- **Yönetmelik**

i. İstihdam Danışma Kurulu Toplantısı ile Çalışma Usul ve Esasları Yönetmeliği (A.E.: 393 09.06.1995)

C. Engellileri Koruma, Rehabilite ve İstihdam Yasası (64/1993)

i. Tüzük

1. Engellileri İstihdam, İşyeri Koşulları ve Engellilere Yapılacak Yardımlar Tüzüğü

(A.E.:551 28.10.1994)

2. Kamuda Çalışan Engeliler Hak ve Ödevleri Tüzüğü (A.E.:570 15.10.1998)

3. Özel Sektörde Engelli İstihdamının Desteklenmesi Tüzüğü (A.E.: 236 27.11.2014)

- **Yönetmelik**

i. Engellileri Koruma, Rehabilite ve İstihdam Komitesi Toplantısı ile Çalışma Usul ve Esasları Yönetmeliği (A.E.:195 15.03.1995)

ii. Engellileri Komitesi Toplantısı ile Çalışma Usul ve Esasları Yönetmeliği (A.E.: 556 07.09.1999)

D. Türkiye Cumhuriyeti ile Kuzey Kıbrıs Türk Cumhuriyeti İşgücü Andlaşması (Onay) Yasası (25/1987)

E. Basın İş Yasası (44/2007)

F. İş Sağlığı ve Güvenliği Yasası (35/2008)

i. Tüzükler

1. İşyerlerinde Asgari Sağlık ve Güvenlik Koşulları Tüzüğü (A.E.:335 21.01.2009)

2. Çalışanlar Tarafından Kullanılan İş Ekipmanlarının Asgari Sağlık ve Güvenlik Koşulları Tüzüğü (A.E.:336 21.04.2009)

3. Kişisel Koruyucu Donanımın İşyerinde Kullanımı Tüzüğü (A.E.:337 21.02.2009)

4. Güvenlik ve Sağlık İşaretleri Tüzüğü(A.E.:338 21.04.2009)

5. Yüklerin Elle Taşınmasında Asgari Sağlık ve Güvenlik Koşulları Tüzüğü (A.E.:339 21.04.2009)

6. Çalışanların Maruz Kaldıkları Gürültü Riskine Karşı Asgari Sağlık ve Güvenlik Koşulları Tüzüğü(A.E.:340 21.04.2009)

7. İş Sağlığı ve Güvenliği Hizmeti Veren Kişilerin Sertifikalandırılması ve Kuruluşların Yetkilendirilmesi Tüzüğü (A.E:679 09.11.2010)

8. İşyerlerinde Risk Değerlendirmesi Esasları Tüzüğü (A.E.: 680 09.11.2010)

9. Patlayıcı Ortamda Çalışanların Sağlık ve Güvenlik Koşulları Tüzüğü (A.E.: 393 12.07.2013)

II-Çalışma Dairesi'nin Uygulanmasından Dolaylı Sorumlu Olduğu Yasa, Tüzük ve Yönetmelikler:

- AsgariÜcretlerYasası (22/1975)
- YabancılarınÇalışmaİzinleriYasası (63/2006)

i Tüzük

1. YabancılarınÇalışmaİzinleriTüzüğü (A.E.:140 26.02.2007)

Appendix (4b)

Tahkikatı yapılan İş Kazalarının faaliyet Sahalarına Göre Dökümü (2006 – 2014)

		2006			2007			2008			2009			2010			2011			2012			2013			2014		
Kod	Ekonomik Faaliyet Ana Grupları	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı
A	Tarım, Avcılık ve Ormancılık	20	19	1	12	12		3	3		1	1		12	12		6	5	1	8	7	1	14	13	1	7	7	
B	Balıkçılık																											
C	Madencilik ve Taşocakcılığı	5	5		5	4	1	3	3		1	1		1	1					2	2		1	1		7	7	
D	İmalat	49	48	1	61	61		65	63	2	52	51	1	70	70		77	75	2	43	42	1	46	46		51	51	
E	Elektrik, Gaz, Buhar Su Üretimi Dağıtımı	13	12	1	13	13		4	3	1	6	6		11	9	2	2	2		10	10		6	6		7	11	
F	İnşaat	87	83	4	106	99	7	66	64	2	68	66	2	56	56		56	53	3	56	55	1	59	56	3	45	41	4
G	Toptan ve Perakende Ticaret, Motorlu Taşıt, Ev Eşyaları Tamiri	39	38	1	41	40	1	30	42	1	28	27	1	48	48		38	38		35	35		45	42	3	33	33	
H	Oteller ve Lokantalar	9	9		17	17		28	28		31	31		37	37		49	49		29	29		20	20		37	36	1
I	Ulaştırma , Depolama ve Haberleşme	26	24	2	13	13		19	19		26	25	1	17	17		22	21	1	14	14		16	16		18	17	1
J	Mali Aracı Kuruluşların Faaliyetleri				1	1								1	1		1	1					1	1		1	1	
K	Gayrimenkul, Kiralama, İş Faaliyetleri	4	4		4	4		3	3		8	8		3	3		4	4		5	4	1	3	3		4	4	
L	Kamu Yönetimi, Savunma, Sosyal Güvenlik	9	9		1	1		1	1		7	7		2	2		6	6		8	8		3	3		16	16	
M	Eğitim	4	4		1	1		2	2		10	10		14	14		11	11		5	5		8	8		4	4	
N	Sağlık İşleri ve Sosyal Hizmetler				1	1		6	6		2	2		1	1											1	1	
O	Diğer Toplumsal Sosyal ve Kişisel Hizmetler	2	2		10	10					19	18	1	9	9		5	5		3	3		12	12		9	9	
P	Ev İçi Personel Çalıştıranlar				1	1								3	3								3	3				
Z	İlk Defa İş Arayanlar																											
	GENEL TOPLAM	**267**	**257**	**10**	**287**	**278**	**9**	**230**	**237**	**6**	**259**	**253**	**6**	**285**	**283**	**2**	**277**	**270**	**7**	**218**	**214**	**4**	**237**	**230**	**7**	**240**	**238**	**6**

Tahkikatı Yapılan İş Kazalarının İş Kazası Türüne Göre Dökümü(2006-2014)

	2006			2007			2008			2009			2010			2011			2012			2013			2014		
İş Kazası Türü	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı	İş Kazası Sayısı	Yaralı Sayısı	Ölü Sayısı
Düşen Cismin Çarpması	27	27	-	31	31		27	27		32	32		33	33		31	31		23	23		23	21	2	13	13	
Trafik Kazası	32	29	3	28	27	1	41	39	2	55	54	1	49	49		62	60	2	16	16		41	41		54	54	
Yüksek Yerden Düşme	58	53	5	73	70	2	51	49	2	60	57	3	72	72		64	62	2	61	60	1	52	49	3	53	51	2
Sabit Cisimlerin Üzerine Vurma	10	10	-	9	9		5	5		7	7		8	8		5	5		7	7		7	7		7	7	
Aşırı Isıya, Elektriğe,Kimyasal Maddeye Kesici Alete Temas	22	20	2	29	26	3	20	31	2	19	18	1	22	20	2	22	20	2	16	15	1	26	25	1	12	12	
Cisimlerin Arasına Kıstırılma	39	39	-	44	42	2	24	24		22	21	1	38	38		36	36		22	22		30	30		29	27	2
Aynı Seviyeden Yere Düşme	19	19	-	19	19		18	18		26	26		17	17		24	24		20	20		22	22		26	26	
Fazla Güç Harcanması	10	10	-	4	4		2	2		4	4		10	10		10	10		8	8		4	4		3	3	
Hareketli Cismin Çarpması	50	50	-	43	43		36	36		34	34		35	35		20	20		40	40		29	29		34	34	
Kayma ve Çökmeler				5	5		6	6					1	1		3	2	1	1		1	2	1	1	7	6	1
Darp				1	1														1	1		1	1				
Doğal Nedenler (İşyerinde Ölü Bulundu)				1		1													1		1				1		1
Diğer İş Kazaları (Yılan Sokması)																			2	2							
Zararlı Cisme Maruz Kalma																									1	5	
GENEL TOPLAM	**267**	**257**	**10**	**287**	**278**	**9**	**230**	**237**	**6**	**259**	**253**	**6**	**385**	**283**	**2**	**277**	**270**	**7**	**218**	**214**	**4**	**237**	**230**	**7**	**240**	**338**	**6**