Health, Safety and Environmental Practices
in the Construction Sector of Pakistan

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SYED AHMED HASSAN

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ABSTRACT

Many south Asian countries are deficient in appropriate documentation, legislation and surveillance related to occupational health and safety (OHS). All these countries have high OHS incidence rate and labourers working in these countries are constantly exposed to occupational accidents and diseases. Although occupational accidents and work-related concerns have been in debate for a long time, no concrete moves have been taken, making situations worse and posing consistent coercions to an increasing labour force. The current research was carried out to examine the main hazards faced by construction workers in Pakistan and the response of health, safety and environment (HSE) department in plummeting these hazards and in certaining sustainability in construction companies in Pakistan.

Workers working in the construction industry are incessantly bared to unsafe working conditions and have to confront several kind of hazards. This embraces exposure to sound, dust and toxic substances, issues of ergonomics, stress etc. This study employed a comprehensive fact-finding design. Data was harbored using interviews, academic articles and reports from international and national organisations.

Employer, administration and labourers all lack knowledge about OHS issues in Pakistan. The majority of the labourers are unskilled, uninformed and unregistered. There are no native directives, which are coupled with both OHS and the construction industry. There is an absence of safety ethics, and neither reporting nor monitoring is conducted in the construction business. Companies see HSE issues as an economic burden which will eventually end up mounting production costs. Labourers don't follow safety instructions; they don't wear personal protective equipment (PPE), they reckon wearing this equipment would cause obstruction in their work and would influence their productivity. The use of PPE is essential in the construction activity, as it is considered as the last line of defence. All this has affected the construction industry tremendously collectively in terms of financial loss, human loss and image loss, and injury incidence rates have increased alarmingly.

Implementation of sustainable development is a core responsibility of an HSE department. Dearth of HSE means lack of sustainability in the construction sector. Today, sustainability is an important aspect of development. It means that development should not only be economically feasable but also socially and environmentally viable both for current and future generations. There is much need to formulate new strict policy and laws or to amend old ones, laws which are effective and practical in promoting HSE and sustainability norms in the construction sector of Pakistan.

The main hazards that are faced by construction workers are falling from height, lifting activity and electrocution. HSE departments play a chief role in minimizing worksite accidents and in promoting sustainable development in work settings. For ensuring sustainable practices on construction sites, HSE departments formulate integrated working policy, keeping in mind social, environmental and econmical aspects and considering inputs from all stakeholders. In addition, they look for innovative green technologies and green materials which are more environmental friendly, economical and require less energy.

Keywords: Sustainable development, incidence rate, HSE (health, safety and environment), OHS (occupational health safety), PPE (personal protective equipment), interviews

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SUMMARY

Protection against occupational health and safety (OHS) hazards is the prime right of labourers, yet for several years Pakistani construction workers have been struggling to attain this right and many of them have lost their lives. In organizational setups, health, safety and environment (HSE) departments address work-related or occucpational safety issues. The main problem in Pakistan in regards to work-related safety is that people don't know much about it due to which work-related safety issues are not on the government's list of priorities, although the number of work-related deaths in Pakistan is much higher than the number of work-related deaths in Europe.

At the organisational level, most Pakistani construction companies don't bother with work-related ailments and injuries. They do not share information about work-related injuries with government institutions nor with public, and they try to persuade accident victims not to go public with their injuries. These companies don't have HSE departments that address work-related safety issues in their business setup, and as a consequence labourers have to face numerous kind of hazards on a daily basis. The other responsibilities which the HSE departments perform are to monitor and assess whether the whole phase of construction is sustainable or not. Sustainable construction means that the execution of the project and the building itself should be economically, socially and environmentally viable and should last long to serve future generations.

This study assesses HSE pratices in the Pakistani construction sector, how successful HSE departments are in securing workers from major and other work-related hazards and in ensuring sustainability. The research questions are about identifying the main hazards faced by Pakistani construction workers, and identifying the response of HSE departments in managing work-related hazards and sustainability. Interviews and data from local and international organizations have been analyzed to find the answers for these questions.

Falling from heights, lifitng actvity and electrical shock are major hazards, as these three are associated with the greatest number of deaths in the construction sector. HSE departments formulate policy, develop working procedures, set certain targets and monitor both the environment and workers during the construction acivity at worksites. However, there are only few construction companies in Pakistan that have an HSE department, and the rest often have problems simply providing personal protective equipment (PPE) to their workers, and the standard of cleaning and hygiene is extremely low. Since most of construction workers in Pakistan are untrained, they know very little about work-related hazards, and don't demand PPE. These construction workers have both social and financial problems; they are not satisfied with their work situation, salary, education, nor the available sanitary facilities. This affects their ability to work carefully and they remain ignorant about HSE during their working hours.

Establishing HSE departments is the key measure Pakistani construction companies can take for ensuring sustainability and occupational safety within their organisations. HSE department also ensure the use of appropriate PPEs, conduct training and awareness programs, assess and evaluate risks and take steps to reduce them, developing emergency exit plans and providing medication to injured persons at work.

Keywords: Sustainable development, incidence rate, HSE (health, safety and environment), OHS (occupational health safety), PPE (personal protective equipment), interviews

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Acronyms

BREEAM	Building Research Establishment Environmental Assessment Method
C.R.S	Commonwealth Rehabilitation Services
EIA	Environmental Impact Assessment
EMS	Environmental Management Systems
EnMS	Energy Management Systems
HSE/ E.H.S/ S.H.E	Health, Safety & Environment
K.P.K	Khyber Pakhtunkhuwa
LEED	Leadership in Energy & Environmental Design
I.L.O	International :Labour Organization
I.S.O	International Standard Organization
L.E.D	Light Emitting Diode
M.C.P	Mechanized Construction of Pakistan
N.C.L	National Construction Limited
NEBOSH	National Examination Board for Occupational Safety & Health
NESPAK	National Engineering Services Pakistan
N.P.C.C	National Power Construction Company
OHS	Occupational Health & Safety
OHSAS	Occupational Health & Safety Assessment Series
P.E.C	Pakistan Engineering Council
PPE	Personal Protective Equipment
S.A	Social Accountability
SMS	Sustainable Management System
S.R.C.C	Safety, Rehabilitation & Compensation Commission
V.O.C	Volatile Organic Compounds
W.H.O	World Health Organization
W.T.O	World Trade Organization

DECLARATION

It is hereby announced that the research exhibited herein is my own effort excluding where specifically indicated else in the script. This research thesis has not been utilized for any other academic degree or professional aptitude except my current master's programme in Sustainable Development.

Syed Ahmed Hassan

"Productivity is never an accident. It is always the result of a commitment to excellence, intelligent planning, and focused effort." - Paul J. Meyer

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CHAPTER ONE

1. INTRODUCTION

For over many years occupational accidents have been given respect in many countries around the world. This is mainly done due to the cost associated with occupational accidents and injuries and high number of worksite accidents occurred in those countries. Legislation for the prevention of occupational accidents and work related diseases has been introduced in those nations and things started to get improved.

In developing countries, the work related ailments are an increasing problem. Work related diseases seem to be miscalculated, according to the recent studies (Riaz, n.d) therefore incidence rates are normally considered for the comparison between the industries. Most of the construction companies in Pakistan follow responsive strategy instead of pre-emptive strategy. This means that the construction companies take mitigation steps after the occurence of accidents on their worksites. Pakistan has the defective occupational health and safety (OHS) legislation, certain sectors have not been included neither in the Labor Policy nor in the OHS legislation. The national enforcement outfits lack interest in the field (Riaz, n.d).

Pakistan, having the literacy rate of just 57.7 percent (Farooq, 2011) and due to the absence of strong legislation, is considered as a country that lacks safety culture. Additionally, high occupational casualties justifies that the Pakistan has been ineffective in reducing the occupational accidents and injuries. Most of the construction companies, see this topic as liability or an obstacle for them in attaining their professional commitments and goals. Similarly, labourers associate OHS with limitation to their efficiency, wherever personal protective equipment (PPE) has been provided to them, they have initially refused to use it because they don't feel comfortable to work with (S.Awan, 2007).

Since 2003 till 2009, 2,836 fatal incident cases have been reported in Pakistan (Azim, 2010). This is just 0.005 percent representation of 55 million labour, the total labour force of Pakistan. Construction sector is just 6 percent of of the total labour force, this means that 3.3 million labourers are associated with the construction sector. If supposed 6 percent of 2,836 incident cases had been reported by construction sector, than this means only 170 cases have been reported by the sector of 3.3 million labourers during the years 2003-2009. This reflects that the reporting of fatal and injury incident cases is extremely low in Pakistan. This could be because of incompetency of government officers or may be construction companies are not willing to share the complete information about the cases with government officials.The fatality incidence rate per 100,000 workers of Pakistan is 20.7 (Hamalainen, Takala & Sareela, 2005) which is much higher than many affluent nations. In contrast, fatal accident rate of United Kingdom is 0.55 per 100,000 workers (see table 10).

Due to the nature of work, construction sector is considered very complex and dynamic. There are several phases in construction like viability, design, plan, execution, decomissioning, demolition and clearance. Simialry, plumbing, electrical wiring and carpentry are also linked with construction. Various contractors have different nature of work and different working protocols, and they work in same working area. Contractors often replace their workers and since it's an open environment, workers are prone to diseases (Lazarevic & Perry, 2004). Due to the above mentioned fact, construction sector is considered toughest in the world when it comes to the implementation of HSE (Eurostat, 2008). The current legislation related to OHS in Pakistan has many discrepancies as it does not cover construction and agricultural sector (Riaz, n.d). Moral corruption also plays significant part in the construction sector, just for the sake of name and reputation most of the incident cases are not reported to government offices (Ehsan, Anwar & Talha, 2009).

The construction practices are not sustainable either. The construction methods that are practiced in Pakistan have high energy, water and raw material demand and cannot be considered as sustainable construction. The macnhinery and vehicles that are used in construction sector are not environmentally fit; and consume more gasoline and release lot of smoke. In Pakistan, there is no concept of using the pre-fabricated materials. Even today, majority of building components are produced at work sites. All this will eventually increase cost and time. Arrangements for complete in-site facilities require the uninterrupted water and energy supply. The construction industry is one of the major consumers of world's water resources; water is the primary ingredient of concrete. Sometime ice is also required for bringing down concrete's temperature. The construction industry is also linked with high carbon dioxide emissions as most construction sites have diesel generators and the vehicles that are used in construction industry are diesel powered. All phases of construction; design, materials and product manufacture, distribution, on-site operations, in-use emissions and refurbish/demolish contribute significantly in the carbon dioxide emissions. Floorings and carpets often contain volatile organic compounds (V.O.C) which deteriorate the indoor air quality. Most of the building projects lack alternative energy option like solar or wind and incase of power shutdown, activities in these buildings

come to halt (Haseeb, Xinhailu, Bibi & Rabbani, 2011). All this menace has portrayed Pakistan as the unsafe home for workers.

1.1. Problem Statement

During the years 2006-2008, statistics have indicated that atleast 1,333 workers (including construction workers) have lost their lives or injured at their jobsites, the trend still continues as research studies have revealed. These deaths have neither been discussed on national tv nor in public or in parliament. The reason for this ignorance is still unknown but should be known sooner, otherwise no one knows how far and for how long these deaths will follow us. I will, therefore examine the relevant data with the primary motives of identifying relevant occupational health and safety problems of the construction workers in Pakistan and then on the basis of this knowledge, framing some suggestions to the government, workers and Pakistani construction companies.

1.2. Objectives

As I mentioned in the above section, it is very important to identify the actions and the actors responsible for the Paksitani construction industry's fatalities, whether those acts were self motivated or some other factors were also involved, therefore the first step is to investigate and reveal the causes of these deaths. Most of the death cases that have occurred on construction worksites are and have been associated to occupational health and safety hazards. I will, therefore scrutinize the relevant data with the basic objectives of identifying relevant occupational health and safety issues of the construction workers in Pakistan and on the basis of this knowledge, formulating some recommendations to the government, workers and Pakistani construction companies.

The study seeks to answer the following research questions particularly in relation to the Pakistani perspective:

1. What are the main hazards confronted by Pakistani construction workers and how are they affecting them?
2. How do health, safety and environment departments respond to occupational health and safety hazards?
3. How significant are HSE departments in ensuring sustainable construction in Pakistan?

CHAPTER TWO

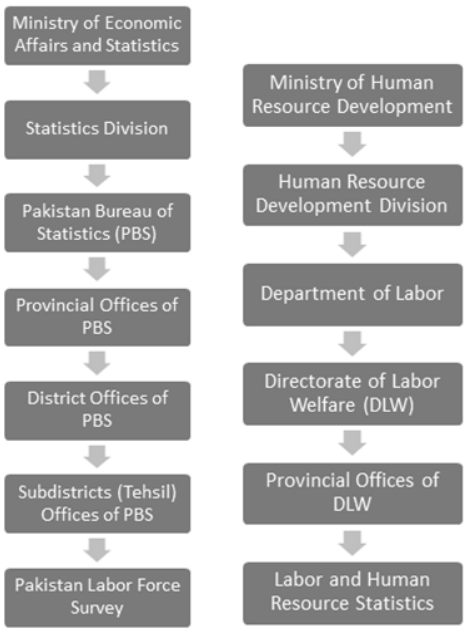
2. BACKGROUND

2.1. Occupational Health & Safety in Pakistan

Although much have been written about the occupational health safety (OHS) issues in Pakistan but none of these reports are comprehensive. Most of these reports are regional and occupational sector specific with the marginal sample sizes. Government so far has not considered any conclusions suggested in these reports due to which even today occupational hazards still exists in the society (Hisam, 2007). Generally, the government of Pakistan involves two ministries; the ministry of economic affairs and statistics and the ministry of human resource to gather the labour related data (pakistan.gov.pk, 2012).

In order to get the labour's statistics, the ministry of economic affairs and statistics conducts labor force survey across the country while the ministry of human resource development collects the data from its provincial offices "Directorate of Labor welfare" (see figure 1).

Figure 1: Method of Collection of data by the Pakistani Government



Source: International Labor Organization

Figure 1 demonstrates the mechanism of the collection of data by the government institutions from industries and construction companies. Representatives of the Pakistan Labor Force Survey and Labor Human Resource Statistics coordinate with the construction companies, collect and compile data and forward them to tehsil, district, provincial and federal offices. Key areas like economic pointers, labourforce figures, vocational edification and specialized drills, expatriation facts, business associations, occupational switch digits, employees well-being and their fortification are contained in the Labor and Human Resource Statistics (Azim, 2010) while the Labor Force Survey covers job, joblessness, underemployment, work durations, salaries and literacy level (ILO, n.d). The authencity of these figures have been doubted for several years as there is no legal binding for the construction companies to participate in the surveys or to share their data with the governmental outfits (T.Awan, 2007).

The only governmental institute that trains workers about OHS in Pakistan is "Centre for the Improvement of Working Conditions and Environment" (Sheikh, 2011). This center was established in 1988, in Lahore, Pakistan jointly by the Punjab's Province Directorate of Labor Welfare, Finnish Institute of Occupational Health and ILO (Pasha, 2003) and the only private institute in Pakistan is "Occupational Safety & Loss Prevention" which has only one centre in Lahore, Pakistan (www.osalp.com.pk, 2011). Soon, the Construction Management and Safety Research Centre will be built in Islamabad, in 2013, jointly by the U.S. Department of State, National University of

Science & Technology and the Higher Education Commission, Pakistan (nationalacademies.org, 2009). These institutes are just the glimpses of improvement in Pakistani's society as they can not serve to the majority of workforce (www.itglwf.org, 2011). These institutes charge high fees and have no branches in other cities. The least salary that a labourer can get is Rs. 7,000 equivalent to 61Euros (Bibi, 2011) . This amount is not sufficient for him as he has many dependants and inflation is continuously increasing, he hardly manages to fulfill his daily needs. Most of the labourers working in construction sector are not permanent so their respective companies don't invest on them for attending the trainings (Lazarevic & Perry, 2004). Although, the governments had proposed OHS ombudsman and tripatrite monitoring councils in the Labor Policy 2001 and 2010 but so far no steps have been taken in this regard (Hisam, 2007). Additionally, Factories Act 1934 gives monitoring power to the district magistrate of each district but in actual Punjab, which is the largest province of Pakistan only has 2 technical inspectors of factories and one industrial hygienist for the monitoring of 36 districts of Punjab (Pasha, 2003).

Lack of understanding, inspections, reporting and legislation have exagerated the OHS problem in Pakistan (Raheem, Azhar, Choudhary & Riaz, 2011).. Due to the above mentioned facts, working sites in Pakistan are still vulenerable to the OHS hazards. The need to address OHS problem has become inevitable now, with every passing day more and more workforce will get affected from this problem.

2.2. Labour Force of Pakistan

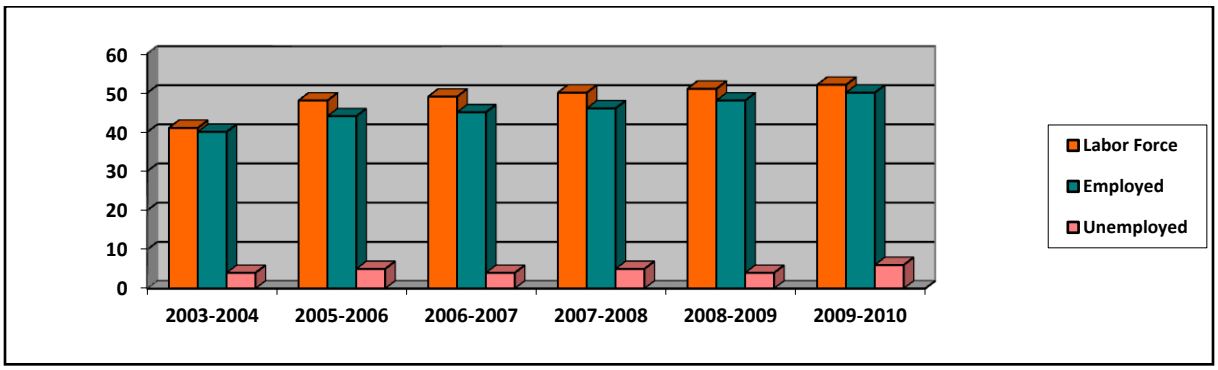
The population of Pakistan is around 177.10 million. In terms of population, it is the sixth most populous country of the world with a growth rate of 2.07 percent and total fertility rate is 3.5 per woman. If the same trend continues, by the year 2015 Pakistan will reach 191.7 million and 242.1 million by 2030. Pakistan will become the 4th largest nation on Earth by the year 2050 (Bibi, 2011). The total labour force of Pakistan is 54.92 million, 33 percent of total population is associated with labour work. This makes Pakistan's 9th principal nation in the globe in terms of the volume of its work force in 2010. Table 1 portrays the labour share of Pakistan in South Asian labour market.

Table 1: Size of Labour force in Asia

Size of Labour Force		**Labour Force**
Rank	**Country**	**(millions)**
1	China	812.7
2	India	46.7
8	Bangladesh	72.5
9	Pakistan	54.92
33	Nepal	18
56	Srilanka	8.1
Source: Economic Survey of Pakistan, 2009-2010		

In Pakistan, about 3.05 million labour force was projected as jobless in 2009-2010, having the unemployment rate of 5.6 percent (Bibi, 2011). For the same year 2009-2010, the employment rate was 94.45 percent; 51.87 million of labour force was enjoying different kinds of jobs (see figure 2). As reflected in figure 2, unemployment rate for year 2009-2010 had increased from the previous year 2008-2009. The reasons could be several ranging from global recession to law and order situation in the country. All sectors of business got affected from the situation. The construction industry had seen it'worst during these years. Failure of the construction companies to produce capital, to encourage investment for their projects, and the high cost of the raw materials and construction contractors are some of the key reasons for the decline of construction activity in the country (Hasan, 2011). The downfall of construction sector has also affected the construction workers and that's why uneployment rate has increased in the country.

Figure 2: Civilian Labor Force, Employed and Unemployed in Pakistan



Source: Economic Survey of Pakistan, 2009-2010

Table 2 indicates that the employment in construction sector has improved by 0.1 percent in 2009-2010 while the employment in agriculture and wholesale and retail trade have reduced. This increase in employment by 0.1 percent in the construction sector is mainly due to the rehabilitation work after the floods and counter insurgency however investment from private sector remained decline (Hassan, 2011).

Table 2: Employment Shares by Industry (%) in Pakistan

Major Industry Divisions	2008-2009			2009-2010		
	Total	**Male**	**Female**	**Total**	**Male**	**Female**
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
Agriculture/ Forestry/ Hunting & Fishing	45.1	37.3	74.0	45.0	36.6	74.9
Manufacturing	13.0	13.3	11.9	13.2	13.9	11.0
Construction	6.6	8.3	0.4	6.7	8.5	0.3
Wholesale & Retail Trade	16.5	20.5	1.6	16.3	20.2	2.1
Transport/ Storage & Communication	5.2	6.6	0.2	5.2	6.6	0.3
Community/ Social & Personal Service	11.2	11.1	11.6	11.2	11.2	11.2
Others *	2.4	2.9	0.3	2.4	3.0	0.2

***Other (includes mining & quarrying electricity, gas & water, financing, insurance, real estate & business services and extraterritorial organizations and bodies)** **Source: Labor Force Survey Pakistan 2009-2010**

2.3. Construction Sector of Pakistan

Construction is a procedure by which structure is built by using material, equipment and machinery. Various steps are involved in construction; it starts from organising and scheming, and concludes at maintenance. Most of the times, project is controlled by project manager, and overseen by several sub-ordinates including construction manager, design engineer, architect, materials engineer, quantity surveyor, quality assurance manager, planning engineer, construction engineer, logistic manager, supervisor, and labour.

Construction sector has tremendous prospective in Pakistan. There are 1016 registered engineering service providers, 84,224 engineers, and 22,784 licensed constructors in Pakistan that are linked with the construction sector. 2.4 percent of Gross Domestic Product (GDP) is associated to the construction sector (Mazhar, 2006). The total workforce associated with the construction sector is 3.7 million, 6.7 percent of country's economic activity. In comparison with other economic sectors, construction sectors stands at second last spot when it comes to employment share. Agriculture sector is the most important sector, most number of individuals are associated with the agriculture. Almost 24.75 million workers are associated with farmer profession while the economic sectors like trade, manufacturing, services and transport contribute 16.5%, 13%, 11.2%, and 5.2% employment share respectively. The number of individuals associated with these sectors are 9 million, 7.1 million, 6.1 million and 2.8 million respectively (Bibi, 2011).

Various industries run side by side with the construction industry. Around 40 industries such as, timber, cement, iron, steel, marbles, tiles, wood, stones, electrical and gas, horticulture, interior decoration, transport, light-heavy construction machinery, plastics, fibers, furniture, sanitary works, glass, paints and varnishes, electrical lightning, power, electrical appliances, and many more move hand in hand with this sector (Rana, 2003). That's why this sector is considered as vital business resource of the country. The pace of construction in a country signifies it's development. The relationship between the pace of construction and the country's development is directly proportional (Baig & Hussain, 2011). The sector also contributes in services sector, such as transport, storage, real estate and finance. Today, construction business is known as constribusiness (Plessis, 2002).

Each single penny that is contributed in construction industry has a direct influence on various industries; a unit increase in investing in construction sector has a synergic outcome and the possibility to gain revenues upto five times the price of the unit (Baig & Hussain, 2011). The construction industry has the potential to grow at 14 percent if economy grows at 10 percent and it can produce 3.2 million new employment opportunities in the decade. Construction sector has the ability to create synergic effect as various business sectors influence by this sector. The pace of construction sector also propels other economic sectors and this relationship is positvely inclined. With strong construction business, economic and communal gains come, such as poverty reduction, greater consumer savings and increased investments (Nenova, 2010)

The sector can also generate low paid jobs like security guards, medium paid jobs like masons, carpenters, electricians, painters, plumbers etc., as well as high paid jobs like architects, engineers, contractors etc. According to the 1998 census, there are 19.3 million housing units which are not sufficient enough to fulfill the requirements of growing population, and out of which 50 percent are old. In the last decade, many big names like National Construction Limited (NCL), National Power Construction Company (NPCC), and Mechanized Construction of Pakistan (MCP) have malfunctioned and disappeared from the civic sector. Likewise, private sector has been unqualified to boom successfully, both in physical and architectural services, because of the lack of readily available capital, shortage of skilled labour, law and order situation, lack of foreign investment and inflation in raw materials prices (Mazhar, 2006).

National Engineering Service Pakistan (NESPAK) has been providing engineering services during last 30 years to 32 countries but due to the same mentioned reason this organization is also struggling for business (Mazhar, 2006).

2.4. Health & Safety Laws in Pakistan

Prior to World War I, the common notion was that the workers were replaceable but after the World War, labour shortages has been felt. Workers' rights has been spotted during that time, but no attention was made towards improvement of working settings. The most significant incident leading to the regulation of occupational safety was Triangle Shirtwaist's fire. It was occurred in New York City on March 25, 1911. 146 garment workers died mainly due to the suffocation, smoke inhalation, fire, or falling to their deaths. Similarly, in 1930 when the construction of the Hawks Nest tunnel was in progressed near Gauley Bridge, West Virginia, workers exposed to the silica dust. At least 476 mine workers killed and 1500 disabled by silicosis. This was probably American worst industrial disaster. In 1986, Chernobyl disaster had affected 500,000 workers (Riaz, n.d).

Health & safety law is a frame of regulations that connects specified fragments of the population such as working class and health, safety and welfare of community. Felon law, regulatory power and inspectorate normally ensure implementation of health and safety law in most of the countries.

Individuals, business or cartels are accounted or compensated for individual's injury or loss of life by means of the regulatory framework for occupational health and safety and civil law mechanism Normally OHS law and the civil law function together. OHS law normally has the provisions related to laxity and occupiers liability. These provisions are made into force and are referenced whenever relevant cases are brought up before the labour courts. These provisions provide special rights to enforcement agencies to investigate the suspect and penalize the guilty.

As mentioned above; authorization, supervision and enforcement are the core values of any regulation. United States had framed Occupational Safety & Health (OSH) Act 1970 which provides detailed framework about health & safety, while Occupational Safety and Health Administration ensures act's enforcement by providing assistance, education and trainings and by reviewing the statute and standards. Occupational Safety & Health Review Commission facilitates administrative hearing and appellate review. OSH Act is a code-based legislation as it provides detail methods on how to get things done. United Kingdom had formulated Health & Safety at Work Act 1974 that defines core structure and authority for the encouragement, directive and implementation of work-station health, safety and well-being. Health and Safety Executive plays the same role in United Kingdom as Occupational Safety and Health Administration plays in United States.

In Australia, Occupational Safety & Health Act 1984 provides fundamental charter related to health and safety at work spots, while Safe Work Australia provides relevant assistance, edification and trainings. Commonwealth Rehabilitation Service (CRS) assists the disabled and handicapped persons regarding their job related matters and their reintegration in society (weblaw, n.d). The Safety, Rehabilitation and Compensation Commission (SRCC) facilitate judicial trials and appellate review (see table 3). Unlike American's OSH Act 1974, Australian act is an outcome-based legislation which means that the law is flexible, need-based, and focuses on demand and performance requirement (Cole, 2003).

Although 20 percent of global world force is from South Asia (Anon, 2001) but effective legislation on health & safety still lacks in the region (Carter, 2009) that's why South Asian countries have had high fatality incidence rate e.g. fatality incidence rates of Afghanistan, Bangladesh, India, Nepal, Pakistan and Sri Lanka are 19.9, 26.4, 11.5, 29.9, 20.7 and 18.3 respectively (Hamalainen, Takala & Sareela, 2005). The legislation in Gulf Countries is disintegrated and is at the preliminary phase of development. As contrast to health and safety legislation, explicit legislation is not promptly accessible and exists only in the shape of Labour Law in most of the cases. There is an existing legislation in UAE, however, it differs from one emirate to another and is not centralized (Redfern, 2010).

Table 3: Regional OHS law and governing bodies around the world

Country/ Region	Occupational Health & Safety Law	Concerning Bodies
European Union	Directive 89/391/EEC	European Agency for Safety & Health at Work (EU-OSHA)
Malaysia	Occupational Safety & Health Act 1994	National Council for Occupational Safety and Health
China	Occupational Work Safety Act 2002	Regional Health Departments – Institute of Health Inspection, State Administration of Production Safety
Korea	Industrial Safety & Health Act 1981	Korean Occupational Safety & Health Agency (KOSHA)
Singapore	Workplace Safety & Health Act 2006	Ministry of Manpower
Australia	Occupational Safety & Health Act 1984	Safe Work Australia, The Safety, Rehabilitation and Compensation Commission (SRCC)
New Zealand	Health and Safety in Employment Act 1992	Department of Labour
		Source: International Labor Organization, 2012

2.5. The Factories Act 1934

One of the founding members of WTO was Pakistan. In 2006, abolishment of quota scheme occurred and every nation got trade rights on equal footings. After the globalization of commerce, environmental cognizant and health and safety criterion was echoed by numerous organizations. In accordance with WTO, now it's obligatory for foreign investors and importer to conform to the International Standards Organization (ISO) codes. New legal requirements were incorporated into the existing federal laws by republics all around. Similarly, laws related to the occupational health and safety were also introduced in Pakistan such as Factories Act 1934, Hazardous Occupation Rules 1963, Mines Act 1923, West Pakistan Shops and Establishments Ordinance 1969, Provincial Employees Social Security Ordinance 1965, Workmen Compensation Act 1923 and Dock Laborers Act 1934. However, the current regulations have limited applications and there is no solo comprehensive piece of document that addresses occupational health and safety and all commercial sectors (Riaz, n.d).

Factories Act 1934 is the only law that addresses occupational health and safety (OHS) issues in Pakistan; health and safety has been addressed in chapter 3 of this law. The Factories Act 1934 applicable to facilities where ten or more workers work and any manufacturing procedures are conceded. It proposes essential steps that should be taken for ensuring worker's safety and prevention against occupational illness. It necessitates providing for better health services, sufficient resources, uninterrupted aeration, proper illumination, dust control, emission and fume control,

fire safeguards, occupational hygiene, sanitation and maintenance. In addition to that, it consists general clauses concerning clinical checkup in particular instances, hiring a social official in the case of 500 or more workers, instituting a refectory in an establishment with 250 or more workers and rest-shelters where there are 150 or more workers (M.Khan, 1988). Factories Act 1934 also covers working hours and working conditions in factories. It confines working hours per week to forty-eight with exception to double time rates, a day break in a week and annual vacations of ten days. It also bounds under-age Labourers, children below twelve cannot work in factories, and those under fifteen cannot work more than five hours a day (Keddie, 1957).

Factories Act 1934 encompasses very rudimentary aims of occupational health and safety measures. It only controls certain occupations as hazardous, and contains particular provisions to regulate the work settings in those fields and ignores the rest. The mentioned prescribed measures are not in practice now, not at least in affluent nations. In this law, many sectors with enormous hazards and of great quantum are not covered, such as agriculture, construction and informal/self-employed. There are no outlines for least qualifications of health and safety professionals (Riaz, n.d).

2.6. OHSAS-18001

Occupational Health and Safety Assessment Series (OHSAS-18001), is an international known standard for the occupational health and safety management systems established to tackle numerous occupational safety and health concerns commonly confronted by workers (Zeng, Tam & Le, 2010). The system is a documentation comprehensive that can be reformed and personalized to serve to organizations, industry or region specific requirements (Remmen, Jorgensen & Mellado, 2005). It provides a framework to spot, mitigate and lessen the risks coupled with health and safety at workarea. It gives requirements for an occupational health and safety management system, to facilitate an organisation to limit occupational risks and enhance it's effectiveness. It does not specify the performance criteria, nor gives comprehensive requirements for the design of a management system. Rather, It is used to test the effectiveness of occupational health and safety management system and to build the confidence that the management system meets legal and policy requirements. In order to be effective, management system should be tested according to the guidelines of the recognized standard, and OHSAS-18001 can be beneficial in attaining that (Zeng, Tam & Le, 2010). The fundamental motive behind OHSAS-18001 is to consistently reduce the occupational threat/risk at the jobsite, which in return enriches the company productivity and reduces it's cost of production (Singh, 2009).

Thirteen foremost commerce bodies, international standards and accreditation councils had established this system to assist a gap where no independent body certifiable specification endures (Philips, Mors & McDonald, 2003). By the year 2006, around 25,000 organizations of 82 countries were certified to this standard. The OHSAS-18001 approach empowers organizations to determine the loop holes in their management system, recognize their hazards and ascertain those risks that are not tolerable and need to be delimited (Smith, 2008).

Instead of being reactive, OHSAS-18001 is a proactive approach, as the system is capable of assessing risk and analyse hazard prior to the occurrence of any mishap. After assesing risks, inspectors propose control measures. These control measure can be technical or administrative or both. Thorough identification of hazards and assessment of likelihood of potential harm occurrence are fundamentals of this standard. As stated in section 4.3.1 of 2007 version:

"When determining controls, or considering changes to existing controls, consideration shall be given to reducing the risks according to the following hierarchy:

a) Elimination,

b) Substitution,

c) Engineering controls,

d) Signage/ warnings and/or administrative controls,

e) Personal protective equipment"(Smith, 2008)

The OHSAS-18001 specifications are applicable to an organization that wants to:

- Introduce an OHS management system for the elimination or reduction of risks posed to employees and other interested parties whose activities may cause OHS incidents

- Implement, maintain and continually improve an OHS management system.
- Assure itself of its conformance with its stated OHS policy and contractual commitments.
- Demonstrate such conformance to competitors or clients
- Seek certification/ registrations of its OHS management system by an external organization.
- Make a self-determination and declaration of conformance with OHSAS specification (Pheng & Kwang, 2005)

Most of the foreign clients who do business with the Pakistanies companies have the requirement that a party must comply to OHSAS-18001 standard and should be OHSAS-18001 certified. OHSAS-18001 is the only tool that is available in the market to test effectiveness of OHS management system. Since most construction companies do not have HSE department, they also lack OHS management system. Implementation of OHS management system is impossible without the existence of HSE department (as discussed in section 2.8). Wherever in Pakistan, HSE dapretments exist, they use OHSAS-18001 for testing and reviewng the effectiveness of their OHS management systems.

2.7. Pakistani Labor Policy 2010

Labour policy is a time-limited draft framed by the government in consultations with other shareholders that describes comprehensive codes and plans connected to work and worker privileges. Assurances of financial, communal and political rights are the crux of labour policy. This policy also signifies pledges to all citizens by the republic's constitution, international treaties and ILO concords. It proposes substantial guideline for statutory amendments (Hisam, 2010). Labor Policy 2010 was publicized on 1st May and the point related to HSE. was

- *At the district, provincial and federal echelons, tripartite scrutinizing commissions shall be established to observe the enforcement of labour laws, specifically those related to disbursement of salaries, job-sites and timings* (Nishapuri, 2010)

With the policy, most of the experts are discontented; according to them this policy is exceptionally deficient in research and vision on ground actualities, defective on all accounts and reflects unwillingness of the state's own past and present actions. Labour policy has had, by and large, remained dysfunctional and detached from regulation in Pakistan. None of the earlier five labour policies 1955, 1959, 1969, 1972 and 2001 incorporated into pro-labour laws. Agricultural and construction workers right of unionization and shared negotiating has not covered in the labor policy 2010 (Hisam, 2010).

Although, state had assured occupational safety and health legislation in the labor policy 2001 but the government didn't keep its commitment. This time again, government has ensured the establishment of tripartite monitoring bodies that will observe work settings in the country. It has been one and a half year since then, but still there is no news about these commissions.

2.8. Role of HSE Department

Work-associated health, safety and environment (HSE) comprise the communal, cerebral and corporal comfort of labourerss, their dependents and the society. In order to achieve this collabouration and contribution among government, workers, trade unions and other bodies is required. Less consideration has been given to work-related health, safety and environment concerns, but it would cost immensely if ignored. Understanding and ability to protect ourselves, our loved ones, community and the surrounding that we so much rely upon for existence is the key thing to have. Lives of labourerss and their relatives, community, proprietors and state might get affected seriously by work-related accidents and diseases (Kirby & Hurst, 2004). Table 4 illustrates effects of work-related accidents on individuals, community and government.

Table 4: Work-related Effects of Accidents

Affectees	Effects
Workers and his family	The grief and suffering of the injury or sickness, The loss of salary, The conceivable loss of a job, Treatment costs
Community	Seeing a adored and praised-worthy individual suffering from an injury or ailment, anxiety and tension, Time and effort to look after for the person, Financial damages and hardship, Loss of life
Employer	Payment for task not done, treatment and compensation expenditures, Repair or replacement of damaged machinery and equipment, Decrease or a provisional halt in production, High training expenditures and administration costs, Potential decline in the quality of work, Negative impact on morale of other worker
Government	Decrease in Gross National Product (G.N.P)
	Source: ILO, 2004

These days, many companies have HSE departments as a part of their organizational structure or administrative wings. The chief objective of HSE departments in any organizations are to reduce work-associated health, safety and environmental accidents and diseases. Some responsibilities of HSE departments are mentioned in table 5. These responsibilities are assigned to curtail environmental, occupational health and safety, community health and safety, construction and decommissioning, and sustainable development issues at work site.

Table 5: Responsibilities of HSE Department

Areas of Interest	Responsibilities
Environmental	Water Conservation, Hazardous Materials Management, Waste Management Noise Control, Contaminated Land and Remediation, Air Emissions and Ambient Air Quality, Energy Conservation, Wastewater and Ambient Water Quality
Occupational Health & Safety	Personal Protective Equipment (PPE), Special Hazard Environments, Monitoring, General Facility Design and Operation, Communication and Training, Physical Hazards Protection, Chemical, Hazards Protection, Biological Hazards Protection, Radiological Hazards Protection
Community Health & Safety	Traffic Safety, Transport & handling of Hazardous Materials, Disease Prevention, Emergency Preparedness and Response, Water Quality and Availability, Structural Safety of Project Infrastructure, Life and Fire Safety (L&FS)
Construction & Decommissioning	Environment, Occupational Health and Safety, Community Health and Safety
Sustainable Development	Reduction in Carbon footprint, Reduction in Energy footprint, Reduction in Water footprint, Conducting Lifecycle assessment, Industrial symbiosis
	Source: World Bank, 2007

2.9. Sustainable Construction

Since last decade, sustainable development has been one of the most widely discussed topics in industry. Today most of us understand that we have not inherited environment from our ancestors, but we have to share it with the coming generations. It is the fundamental right of all human beings to have a clean and healthy environment. Today, with an increase in global population resources have become more precious than ever before. Scientists are looking for technologies which are highly efficient, which require less raw material and energy inputs and produce finished products in least possible time with minimal waste products and without effecting environment. Environments serves as both source and sink and resources on the earth are limited. Among resources, some resource take less time to recharge while others require considerable time to replenish. All these facts have influenced corporations and forced them to run their business in a way that would be more planet-friendly. Industries now are more concern about the raw-materials availability and cost, and about the cost of production (see table 6). For companies, sustainable development is a long run strategy. Sustainable development is a one such discipline that covers all, from phytoplankton, people, profit and planet (Hauff, 2007).

Table 6: From Sustainable Development to Sustainable Construction

Aspects	5 global challenges to address	The key role of the building sector
Environmental	Energy supply security	• 160 million buildings across the Europe consume 40% of Europe's total energy (Warren, 2002) • Heating and cooling in buildings consumes 2/3 of energy (Kavcic, et al., 2012). • If buildings were made more energy efficient, 3.3 million barrels of oil could be saved each day in Europe (eurima.org, 2007).
	Climate change mitigation	• In Europe through cost-effective energy efficiency measures in buildings, 460 million tons of CO2 emissions could be saved each year (Ibid). • In the US, 39% of the CO_2 emissions are contributed by the buildings (Ibid).
	Waste management & resource preservation	• In OECD countries, buildings produce 30-40% of solid waste, use 30% of raw material and use 10% of land (Machart, 2009)
Social	Health and well being	• In the US alone, annually $5.9 billion could be saved in economic costs linked to air pollution and health care simply by improving insulation (Levy, Nishioka & Spengler, 2003).
Economical	Economic growth/ availability of financial resources	• In EU 27, the average housing costs for overall population amount to 22.5% of disposable income (Pittini, 2012) • Through an ambitious strategy to improve energy efficiency in buildings, up to 530,000 jobs would be created in Europe (eurima.org, 2007). • An increase of $28.5 billion in income and 1.1 million jobs could be resulted by aggressive increases in US building energy codes (Ibid)
		Source: (Machart, 2009)

Sustainable development is a mutlidisciplinary subject, it covers economics, social and environmental aspects of any product or project. Since construction practise is also a mix of social (people), environmental (natural resources) and economics (investments) therefore both construction and sustainable development can be related to each other (Pearce, 2003). The two terms have been been merged now into one, and is known as sustainable construction. It is defined as a holistic method focusing to refurbish and preserve synchronization between the natural and built surroundings, and originate neighbourhood that assure human pride and facilitate financial justness. Mankind and nature are interdependent, both have great influence over each other. To maintain the balance between the issues of construction and environment, the concept of sustainable construction has been evolved. Sustainable construction covers every phase of construction, from feasibility till disposal. It covers environmentally centered designs as well as nature friendly process and upkeep methods. This includes production of the environmental friendly construction materials in a sustainable way (Plessis, 2002).

Relative terms that refer to the sustainable construction are sustainble buildings, green buildings and green construction (Cole & Lorch, 2003). In affluent nations, 10 percent of country's GDP is associated with construction activity (Costantino, 2006). In the EU, 40 percent of total available energy is consumed by buildings, which is equivalent to 30 percent of total CO_2 emissions and 40 percent of all man-made waste. Similarly at macro-economic level, construction contributes to country's GDP, at meso-economic level, construction sector is made up of services and materials produced by other business sectors and at micro-economic level, construction is associated with personal expectations, including property location and market value (Bon & Hutchison, 2000).

One of the key responsibilities of HSE department is to explore business options that are more sustainable and environment-friendly. When it comes to construction business, sustainable building designs are the center of discussion among architects and designers but apart from that human factor, systems and technology use are also considered (see table 7). Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM) certifications have been introduced in the market, these certifications function as tools to measure sustainability of the buildings. HSE departments also monitor water, carbon, and energy footprints, and continuously looks for the steps to reduce these footprints. International Standard Organization (ISO) standard ISO: 15392 cover principles for sustainability in building construction. The standard covers environmental, economic and social aspects of construction.

Table 7: Targets of Sustainable Construction

Material Production and transportation	Design and Construction	Use	End of life
Key indicators: • Raw material supply • Manufacturing of products ○ Energy and water Consumption ○ CO_2 emissions ○ Impact on air, soil and water ○ Production of waste • Transport to jobsite • ***Impact of the plant on Health and Safety of workers*** • Nuisance of the plant for the neighbors • Global economic impact	Key indicators: • Use of resources • Quality of the building (air-tightness) • Waste generation • ***Health and safety, security of workers on jobsites*** • Nuisance for neighbours (noise, dust, congestion) • Installed performance vs. designed performance • Acquisition and construction costs	Key indicators: • Most important phase for environmental impacts: ○ Energy Efficiency ○ Water use ○ CO_2 emissions • Maintenance and replacement • Impact on the built environment • Solutions for thermal and acoustic comfort • Security: fire resistance health: indoor air quality • Maintenance costs • External costs: heating, cooling, water, electricity...	Key indicators: • De-construction, demolition on site, recovery, disposal and transport • Impact of demolition waste • Building sustainability and ability to evolve over time • Building sustainability and ability to evaluate over time • End of life costs: deconstruction, demolition and recovery/disposal
			Source: (Machart, 2009)

Sustainable construction has three major parts; management and organization, product and building issues and resources consumption. OHS, community, environmental monitoring, environmental impact assessment and life cycle assessment are the parts of management and organization while construction and decomissioning and industrial symbiosis, energy content and recycling ability are the parts of building issues and ecological footprints, carbon and energy footprints, resource productivity are the parts of resource consumption (see table 7). Mainly management and organization covers aspect that are social, legal, economic and political in nature. Both HSE and Sustainable development are interdependent to each other, if sustainable development is a concept than HSE is a mechanism by which one can perform sustainable construction (Plessis, 2002). Unsafe production is unsustainable production (Velasco, 2002)

2.10. Occupational Fatality Rates

Construction is the most dangerous land-based work sector in United States (Anon., 2010) and Europe (Radermacher, 2011) (table 10 & figure 6). In the United States alone, 751 fatal occupational injuries in the construction sector were reported in 2010, while the fatal injury rate per 100,000 employed workers was 9.5 (Anon., 2010). Fatal accidents rate in the European Union and in other parts of the world are mentioned below (table 8).

The formula for calculating fatal incidence rate is:

$$Rate_{industry} = \frac{Fatal_{industry} \times 100{,}000}{Total\ employment_{industry}}$$

Table 8: Fatal Accidents Rate 2005-2008, International Comparisons

States	Rate of Fatal Injury per 100,000 Workers			States	Rate of Fatal Injury per 100,000 Workers		
	2005	2007	2008		2005	2007	2008
Austria	1.5		4.18	**Afghanistan**	19.9	-	-
Belgium	1.1	3.23	2.67	**Argentina**	14.6	-	-
Bulgaria	1.6	3.59	5.18	**Australia**	3.2	-	-
Cyprus	1.5	6.09	4.11	**Bahrain**	15.7		-
Czech Rep.	1.8	2.78	3.56	**Bangladesh**	26.4	-	-
Denmark	1.2	1.5	1.65	**Brazil**	16.6	-	-
Estonia	2.2	2.32	3.47	**Canada**	6.4	-	-
Finland	0.8	1.28	1.35	**China**	10.5	-	-
France	1.2	1.68	1.28	**Combodia**	28.3	-	-
Greece	0.9	-	-	**Egypt**	24.0	-	-
Great Britain	0.3	0.99	0.55	**India**	11.5	-	-
Germany	1.2	1.87	1.59	**Iran**	16.8	-	-
Hungary	1.4	3.18	3.55	**Iraq**	14,2	-	-
Ireland	1.5	2.67	2.43	**Isreal**	14.6	-	-
Italy	1.6	2.39	3.44	**Japan**	3.2	-	-
Latvia	2.3	4.2	4.43	**Korea**	15.7	-	-
Lithuania	2.8	4.94	6.04	**Malaysia**	18.3	-	-
Luxembourg	1.4	3.15	2.84	**Mexico**	15.9	-	-
Malta	2.5	1.93	-	**Nepal**	29.9	-	-
Netherlands	0.4	2.82	1.58	**New Zealand**	3.5	-	-
Norway	-	3.03	2.20	**Pakistan**	20.7	-	-
Poland	1.3	3.54	3.29	**Qatar**	15.1	-	-
Portugal	3.2	-	-	**Russia**	11	-	-
Romania	1.9	8.38	7.96	**Saudi Arabia**	15.7	-	-
Slovakia	1.5	4.54	3.85	**Singapore**	9.8	-	-
Slovenia	1.4	3.37	3.09	**Sri Lanka**	18.3	-	-
Spain	1.8	2.63	3.33	**South Africa**	19.2	-	-
Sweden	0.7	1.84	1.49	**Thailand**	23.3	-	-
Switzerland	-	3.95	2.66	**United States**	5.2	-	-

Source: Eurostat 2005, 2007-2008, (Hamalainen, Takala & Sareela, 2005)

According to table 8, Great Britain is the most successful country in Europe in maintaining the fatal accidents rate down in years 2007 and 2008 while Romania is the worst country in maintaining the fatal accidents rate down during the same years. The worst country in maintaining fatal accidents rate down is Nepal on the list. These rates reflect strength of OHS policy, level of enforcement and awareness in respective countries.

Here I would like to mention that occupational incidence rates and numbers of reported accidents are some of the key parameters for measuring the safety performance of any organization.

Table 9: Fatal and serious accidents at work by economic activity, European Union, 2008

	Serious accidents (1)	**Fatal accidents**
Total	100.0	100.0
Construction	16.5	28.2
Manufacturing	25.5	18.1
Transportation and storage	8.4	15.8
Wholesale and retail trade	13.4	8.1
Agriculture, forestry and fishing	3.4	13.1
Administrative and support service activities	7.5	4.4
Human health and social work activities	7.6	0.6
Accommodation and food service activities	4.8	0.8
Public administration and defense	3.4	1.5
Water supply; sewerage, waste management	1.4	2.2
Mining and quarrying	0.5	2.5
Professional, scientific and technical activities	1.2	1.5
Education	1.8	0.4
Arts, entertainment and recreation	1.4	0.5
Other service activities	1.0	0.4
Information and communication	0.6	0.5
Financial and insurance activities	0.6	0.4
Electricity, gas, steam and air conditioning supply	0.3	0.7
Real estate activities	0.5	0.1
Activities of extraterritorial organizations and bodies	0.0	0.2
Activities of households as employers	0.1	0.0

(1) Estimates made for the purpose of this publication including under-reported levels for Latvia, Poland and Romania, but excluding Greece and Northern Ireland

Source: Eurostat 2008

Table 9 illustrates that even in Europe, construction industry is the most deadly sector. This is mainly due to the fact that the hazards and risks are known in construction industry but due to the consistent change in working environment and many small employers, it is very difficult to control incidents.

Although Pakistan has been an effective and eminent member state of International Labor Organization (ILO) and has ratified 36 conventions, but in Pakistan, no data related to accident and incident rate is available. The reasons will be discussed in coming chapter.

2.11. Hazards to construction workers in Pakistan

According to ILO, occupational hazard is described as "the latent to trigger damage – which may comprise materials or equipment, procedures of function or else other aspects of organization" while risk is defined as "the prospect that the damage from a specific hazard is recognized" (Alli, 2001).

According to ILO, the number of people who died through mishaps and illnesses linked to their profession annually is around two million. In addition to that, around 270 million occupational accidents and 160 million occupational diseases are faced by the workers annually (Somavia, 2003). The working conditions contrast immensely among countries, economic segments and social factions. In developing countries, where large masses are involved in hazardous activities such as construction, mining and fishing death toll is significantly high. The ILO projection is really just the glimpse of problem, because the actual numbers of work-related diseases in developing countries are much higher in reality than the reported numbers (Somavia, 2003).

Generally workplace hazards are cataloged in six groups (see table 10).

Table 10: Types of Occupational Hazards

Types of Hazard	
Mechanical Hazard	Confined space, equipment related injury, slips & trips, falls from height, falling on a pointed object
Physical Hazard	Noise, vibration, lightning, electricity, radiation, magnetic fields
Biological Hazard	Bacteria, Virus, insects, animals, birds, plants, animals, humans
Chemical Hazard	Acids, bases, heavy metals, particulates, explosives, ignitables, fumes
Psychosocial Hazard	Stress, violence, bullying, sexual harassment, mobbing, burnout,
Ergonomic Issues	Muscoskeletal disorders, repetitive movements, improper setup of workstation
Source: Canadian Center for Occupational Health & Safety, 2009	

In Pakistan, very high incidence rate of occupational diseases and injuries have been recorded because dailly hundreds of labourers are exposed to the hazardous working environment. Data about occupational health and safety (OHS) is not accessible in Pakistan because majority of the accidents are not testified (see table 9 & 11). Unlike European Union, U.K, U.S, Malaysia, China, Singapore, Australia and New Zealand, which have strong OHS legislation like; Directive 89/391/EEC, Health & Safety at Work Act 1974, Occupational Safety & Health Act 1970, Occupational Safety & Health Act 1994, Occupational Work Safety Act 2002, Workplace Safety & Health Act 2006, Occupational Safety & Health Act 1984, Health and Safety in Employment Act 1992 respectively, the occupational health and safety regulation and the substructure in Pakistan is very poor. The enforcement agencies neither have effective implementation policy nor strict requirements for filing mishaps at workplaces (Riaz, n.d). In another study conducted in 2005 it was concluded that the Pakistan had fatality incidence rate of 20.7 (Hamalainen, Takala & Sareela, 2005). This incidence rate is far higher than the incidence rate of Romania.

Table 11: Number of Industrial Accidents by Nature in Pakistan, 2003-2009

Nature of Accidents	2003	2004	2005	2006	2007	2008	2009
Total	354	404	415	438	460	439	**326**
Fatal	32	34	38	50	85	108	**45**
Serious	103	68	101	106	130	92	**62**
Minor	219	302	276	282	245	239	**219**
Note: Data of Sindh for year 2009 & Baluchistan 2004-2006 is not available **Source: Provincial Directorates of Labor Welfare, 2010**							

It can be clearly seen in table 11 that in 2009, the number of incident cases reported has been declined. The government's authorities and industries' management have the key responsibility of highlighting the importance of

incidence reporting (Daniels & Marlow, 2005) and this might have had one of the reasons of the decline in number of reported accidents during the year 2009.

Table 12: Classification of Accidents by Causes in Pakistan

Year	2006				2007				2008				Total
	Fatal	Serious	Minor	Total	Fatal	Serious	Minor	Total	Fatal	Serious	Minor	Total	
Prime Movers	-	-	-	-	-	-	-	-	62	-	-	62	62
Transmission	2	2	2	6	-	-	-	-	-	-	-	-	6
Lifting	22	37	109	168	15	27	107	149	17	24	107	148	465
Working	3	28	41	72	1	63	71	135	2	24	28	54	261
Rolling Stock On Line	-	-	-	-	-	-	-	-	-	-	-	-	-
Rolling Stock Not on Line	-	-	-	-	-	-	-	-	-	-	-	-	-
Person Falling	4	2	-	6	1	2	5	8	4	-	-	4	18
Falling Object	-	1	1	2	-	-	3	3	-	-	-	-	5
Hand tools	-	-	1	1	-	-	-	-	-	-	-	-	1
Electricity	6	11	29	46	7	9	15	31	10	6	17	33	110
Position Corrosive Substance & Occupational Disease	2	-	-	2	-	-	-	-	-	-	-	-	2
Explosion & Fire	3	8	15	26	10	7	30	47	9	9	31	49	122
Miscellaneous	8	17	84	109	5	26	52	83	8	25	56	89	281
Total	50	106	282	**438**	39	134	283	**456**	108	92	239	**439**	1333

Source: Provincial Directorate of Labor Welfare, 2010

It can be noticed that most of the accidents are associated with lifting activity. Lifting activity has caused more fatalities than any other activity (table 12). The authenticity of data is questionable as for 3 years only 1,333 cases have been reported and there is no clue about how many incidents were happened on the construction sites. The total labour force of Pakistan is around 55 million and 1,333 cases just represent 0.002 percent of the total labour force. There is no mechanism to counter-check them.

The authoritative statistics on occupational health and safety, amassed grounded upon accidents narrated to the Provincial Directorates of Labor by the employees, it is only diminutive as it discounts mass of workforce. It only displays accidents but furnishes no evidence about occupational diseases. During the year 2002, there were 10,518 registered factories out of which only 1,680 factories had reported the accidents, just 15.97 percent of the total registered factories. The number of factories testifying about the accidents is dwindling gradually. In 1993, 30.58 percent of total number of factories had reported accidents while in 2002, only 15.9 percent of total number of factories had reported the accidents. The other official domain, Pakistan Labor Force Survey, which started stating on the occupational safety and health in 2001-2002 annual survey, has been omitting this vital statistics from its annual reports since 2005. Data from the preceding yearly surveys, however, imply the regression in the reporting of occupational incidents by the craftsmen. In 2001, 3.6 percent of the total number of workers had reported the incidents, while in 2003 survey; the number was reduced to 2.8 percent. This mirrors of a mounting tendency among employers to shroud figures about incidents of occupational diseases and accidents (Hisam, 2007).

The leading safety hazards in construction industry are: struck by falling objects, fall from heights, excavation accidents, motor vehicle crashes and electrocution. Fall from heights is the foremost source of injury in the construction industry. The height where fall protection is necessitated is not mentioned in the law. The other safety hazards are exposure to noise and dust. Motor vehicle crashes at work sites are very common as most of the vehicles don't have emergency brake system and audible warning system. In addition to that, there is no proper labelling and protection at worksite, one cannot identify the marked routes or depression, therefore drivers often drive off-track and at high speeds (Khan Ra, 2012).

Table 13: Number of Industrial Accidents in Pakistan by Industry

Province	Fatal Accidents		Serious Accidents		Minor Accidents		All Accidents		Total
	Perennial	Seasonal	Perennial	Seasonal	Perennial	Seasonal	Perennial	Seasonal	
2003	32	-	67	-	219	-	318	-	**318**
2004	41	-	104	-	250	9	395	9	**404**
2005	37	1	104	-	267	6	408	7	**415**
2006	49	1	106	-	281	1	436	2	**438**
2007	113	-	107	-	255	-	475	-	**475**
2008	46	-	92	-	239	-	377	-	**377**

Note: Data of Baluchistan for years 2004-2006 is not available
Source: Provincial Directorates of Labor Welfare, 2010

CHAPTER THREE

3. MATERIALS AND METHODS

3.1. Methodology

The research was established on the qualitative methods with an emphasis on a content archival analysis and on interviews. Incidence rate of Pakistan has been compared with the incidence rate of countries that have strong legislation, enforcement and awareness to understand the quantum of problem. . In chapter 2, background covers country's construction sector, legislation, policy and protocols, comparison between incidence rates of various countries with Pakistan, nature of accidents and HSE department while interviews were covered in the results chapter. Since it is a qualitative research and social exploratory study, it is not bound to falsifiable hypothetical questions (Burns, 2000) but can also answers research probing questions by means of data gathered. As I have not done any field trip, so instead of doing any field survey or replicable experimentation, I preferred telephonic and email interviews and gone through the relevant text to find out the ripostes of my research queries and to serve aims of the study. As the purpose of this manuscript is not only to find out what is wrong and right but to find out what are wrongs, why they are wrongs, what should be done to make to correct them and to attain in-depth knowledge about HSE issues faced by labourers in construction sector of Pakistan that's why hypothetical questions have been avoided and instead divergent questions are posed. In discussion chapter 5, research answers have been discussed with the help of data covered in chapter 4 and 2 while chapter 6 exclusively covers aims of the study and proposes comprehensive points for the government, workers and enterprises.

3.2. Data Collection

To extract information for my research, the means for data were reports and academic articles from international and national organisations. As narrated by Hofstede (2005) reports and books reflect background of the researcher and author, same is the case with me. As an environmentalist by profession and working in HSE department of construction industry for last 3 years, these two factors have influenced a lot on my observations and understandings. My background will reflect in my research also, selection of authors and articles. Input from media such as documentaries, newspaper, politicians has also been taken into account. However, to overcome and neutralize my own influence on my work I conducted interviews and have tried my best, looking for different sources and prior to thesis writing phase, I read articles from various research journals including Safety Science, Workplace Health and Safety, which is an American Journal and Journal for Health, Safety and Environment, Australia so to have impartial understanding. In addition to that, just to start my thesis with balance frame of mind, I read both international and regional publications available at International Labor Organisation's and World Health Organisation's websites. So at the time of wiritng, I was very neutral and with the passage of time as I found responses from interviewees and literature, I improved my understanding about the issue . For interviews, I had contacted 28 construction companies, out of which only 4 companies had responded positively. All 4 interviewees work as HSE Manager in their construction companies. Out of these 28 construction companies, 7 companies were multinational while rest of them were national companies, doing businesses in housing, industrial, roadworks and petroleum exploration infrastructure.

Following are the questions that I prepared for interviews. These question are most central for my studies, I kept them simple to be specific and to save time of interviewees.

1. What are the evolving HSE matters in Pakistan?

2. Do you know about any of the research program initiated by the government related to HSE at present?

3. What contribution do you think the government has in creation of HSE concerns?

4. How do you see the existing regulation in retort to HSE?

5. What actions do you consider are the most relevant to raise echelon of HSE?

6. What commendations would you like to propose?

7. What is the role of labour unions in promoting HSE in their companies?

Chapter 2, mainly covers numerical data. Data related to Pakistan has been collected from government organisations such as Economic Survey of Pakistan, Labor force Survey, and Provincial Directorate of Labor Welfare as construction companies in Pakistan are reluctant to publicize it. Hence nature of this data is secondary as it is obtained from government organisations. Similarly, data related to Europe and other parts of the world has been collected from International Labor Organization (ILO), Eurostat's Year Book and World Health Organization (WHO) and this data is secondary too. For the verification of secondary data, and to confirm the notion that I felt after gathering secondary data, I conducted interviews.

3.3. Data Analysis

The authenticity of numerical data wherever it is mentioned, was analyzed by first checking mathematical errors. The data was then compared with other secondary sources and was organized as per requirement. Later on, data was grouped into theme beneficial in providing answers to my research questions. The collected data specificially for empirical framework reflects: number of construction industries in Pakistan, fatal incidence rate in Pakistan and in other parts of the world, and no's and classification of accidents in Pakistan by causes and by industry. Data was then grouped into themes, those are: identification of most common hazards, and capability and competency of HSE department. With these themes, subgroups were created under each group in accordance with literature and appropriate theory.

3.4. Validity

To guarantee validity of the data acquired and to give added depth, cross-checking was done. Each piece of data gathered from official sources was double-checked with data from other secondary sources. It was kept in mind to gather latest data, as this will help to draw picture of the current scenario. Here I would like to point out about my other secondary resources; those are research paper and articles from relevant journals and research institutes. My main secondary sources are Economic Survey of Pakistan, Labor force Survey, and Provisional Directorate of Labor Welfare. The main reason for cross-checking is to nullify errors from data and to have complete confidence over data. This will help in concluding the result that will be more meaningful and reliable.

3.5. Limitations of Study

Since Pakistan does not have legislation related to occupational health and safety, industries have not been forced to collect and report data efficiently and regularly. There is no data available which is specifically related to the OHS or to the construction sector; it is a consolidated data which includes all industrial sectors. Most of the studies that are available on the internet have very small sample size. These researches reflect just a glimpse of problems. Even international organizations like International Labor Organizations (ILO) and World Health Organization (WHO) do not have updated specific data on the OHS and construction sector in Pakistan. Due to the mentioned facts, there is a big question mark on the authenticity of gathered secondary data, whether the data is majority representative or not.

Secondly, I had tried to contact construction companies but they were reluctant in sharing the information with me. I had contacted 11 labour unions but none of them have responded yet. Out of 28 construction companies whom I contacted to, 24 companies didn't respond back while only 4 companies had responded positively with a condition not to reveal their employee's identity, company's name and profile. This indicates response rate of 14.3 percent only. It's a normal practise in Pakistan, companies don't disclose their identity because international papers and articles are published on the internet, and this may influence their business.

CHAPTER 4

4. RESULTS

As mentioned before in the introduction chapter, that due to the lack of knowledge about health and safety both in the government setups and the construction sector, the current legislation does not cover the issues of the occupational health and safety faced by the construction workers. The current law, Factories Act 1934 does not apply to the construction sector and due to the fact most Pakistani construction companies do not report accidents to the government officials. This whole scenario creates a doubt about the accuracy of secondary data and therefore it is pertinent to collect first hand information directly from the construction companies. All four interviewees are HSE managers in their respective companies.

To gather the first hand information from the construction industries, interview questionnaire was prepared, see section 3.2. The responses are narrated below in the same order as they were questioned.

4.1. Interview 1

Respondent's main clients are from the petroleum sector, companies like OGDC and multinationals like ENI, BHP Billiton etc. These companies have very strong commitment towards HSE, their management and workers are much aware about the HSE. Respondent's company shows very strong commitment towards HSE documentation but is not as effective on the ground. Commitment towards HSE depends on the clients; most clients do not emphasize on HSE while some are very concerned about HSE and they force the construction companies to implement HSE fully at their working site. They motivate organizations, employees and workers to follow the HSE rules and guidelines.. ISO also has been doing its role in educating people about HSE, after the introduction of Quality Management Systems 9001 certification; ISO encouraged companies to go for the Occupational Health and Safety Assessment System 18001 Certification. However, construction companies who are not associated with the Oil and Gas sector or have local clients, and focus more on government's projects like multistory building, industrial projects, and road works and bridges projects are not serious about the HSE, they neither have ISO certifications nor they are interested in getting those certifications.

One of the main issues of health and safety is uneducated workers; they are not evenly educated or skilled. Some are quite open and adopt the new rules very swiftly particularly the use of PPEs while other show defiance towards new working environment. Some of them have societal concerns while other have economic issues or both, all these worries make them ignorant and they don't bother about the HSE guidelines. To explain the conception further, labourers might be bodily robust but they are not mentally fit due to the above mentioned concerns. Most of them are not pleased with their post, pay, edification and available facilities. Most of these companies, do not consider the HSE department as a essential branch of their organization. Companies should do justice and facilitate their workers more in order to increase their output and consciousness. According to him, in most cases, HSE departmental fund is based on the safety concerns of client. If client is aware of the fact, he will compel the contractor's company to inflict HSE at worksite, and on the insistence of client; contractor's company will release the HSE budget and will then tell the HSE staff to impose HSE at worksite. Normally contractor's company concentrates on to finish the project in nominal time and resources. Respondent further said that he has no information about the current research and awareness programs related to the HSE in Pakistan, neither the governmental organization nor the private organization has communicated his company. Even universities do not tender master programs in HSE.

He stressed that the government should check working sites on daily basis, so far government is not contributing its role in inflicting HSE. Government officers are not conforming the set of rules (Factories Act, 1934) which they had formulated. There is a pressing need to revise the rule of business, government should include the excused service sectors like construction in the Factories Act. Since government does not insist respondent's company to testify the accidents, his company reports all incidents to the client. Construction companies do not circulate their HSE yearly reports and accidents record openly because they think it will affect their standing and ultimately their dealings, so they conceal their findings from their clients, government and media. Media does not project the accidents which occur at worksites or inside industries but it does highlight the road accidents and accidents which happened in open areas. Respondent suggested, establishment of HSE tripartite board in now inexorable, a council that has a strout watch and awareness faction. Respondent stated falling from heights is the most common peril in his company. He has documented and reported many cases of falling from heights to his organization and there is no labour union in his company.

4.2. Interview 2

Respondent's company works both as a consultant and contractor, mainly in road works and gas sector. Currently his company is working with the oil and gas exploration organization. He mentioned that in Pakistan, people do not have grasp about the safety norm. Since his company current clients are multinationals oil and gas companies which are very cognisant about HSE, so currently his company is implementing effective safety plan at worksites. These multinational companies follow the federal legislation of the country they are originated from. His company works as per contractual requirements, if the client insists them to implement HSE at his site then his company will enforce it, and if the client is not serious about HSE then they will not care about HSE as there will be no legal or federal binding over his company.

There are several concerns related to the HSE in Pakistan, there is no assurance whatsoever from the government side. Government has not framed strong legislation and nor they concentrate on enforcement. Enforcement of HSE is the primary responsibility of government without it's commitment it is impossible to execute HSE in the construction sector. Although Factories Act 1934 envelops HSE but it does not curtail the construction sector. This act has not been implemented completely in Pakistan due to the weak implementation mechanism.

According to him, no awareness program has been run by the current government. In most cases, companies themselves organize safety drills and provide trainings to their employees. In his company, after the induction of an individual, performing medical checkups is a routine practice; his company has been bound by the client. Similarly, crane operators also have to submit fitness certificate in his company. He further told that no government's agent has ever come at his work site, neither for the assessment nor for accumulating the incident data. Normally, construction companies do not announce their accident statistics because companies that have low incident rate, have better working prospect than the the companies that have high incidence rate. In most cases, multinational clients favour companies which have low incidence rate over the companies that have high incidence rate.

Respondent also told that his family members and friends do not know about HSE. After his appointment as HSE Incharge, his family members come to know that there is a department called HSE department in the companies. In construction sector, the most mortal cases are connected to falling from heights. In addition to that, slip and fall cases are usual in Pakistan. Workers do not use the fall arrest system, whether it's supplied or not. Labourers are not use to the housekeeping and PPEs usage, they contend while using them they feel uneasy and can't function their duties efficiently. For new appointee, adjusting in new working conditions and observing new working approach is difficult. As proposed by the clients, his company has initiated the penalties scheme for the negligent workers and incentives for the safety conscious workers.

Respondent suggested that the government of Pakistan should prepare strong legislation and should engage proficient and non-corrupt people. Every construction company should be coerced to distribute its accident data with the government. Government should also carry out regular safety audits and should analyze company's commitment towards the HSE. According to respondent, there is no labour union in his company.

4.3. Interview 3

Respondent's company is specialized in building and airside works. Currently his company is working in the telecom sector (erection of BTS towers) and in the power sector (construction of dams). He highlighted that in Pakistan, awareness about HSE is negligible. Decision makers are not competent and most of the time, they follow reactive approach towards any issue. In Pakistan, current HSE practices in the construction sector vary from project to project. In small private or government projects within the city, like construction of 2-3 storey plazas or house, hardly any HSE steps are taken by the client or the contractor or workers. On government related projects, HSE implementation of HSE is hardly seen whether it's a small or big project. However, in mega projects or the donor funded projects like World Bank or multinational companies (O&G, power generation, etc) contractor implements HSE practices to some extent like the use of PPE, reporting accidents, use of safety harness, risk assessments, use of scaffolding, journey management plan, permit to work, inspections, audits, trainings, toolbox talks, etc. The requirement of the implementation of HSE varies with the proponent to other proponent i.e. how much vigorously and strictly proponent wants implement HSE. In Pakistan, most of the exploration and petroleum companies like OMV, BHP, MOL, Schlumberger, Halliburton and in the energy Sector companies like Engro, Fauji, UCH Power, strictly follow the HSE practices, their consultants, contractors and sub-contractors have to follow the HSE rules during the construction phase at each stage. Local citizens, bureaucrats and politicians do not know about HSE and it's importance that's why Pakistan still does not have a strong and effective law and why the government is not running any awareness program either.

There is no specific health and safety law for the construction industry in Pakistan, there are some other laws that cover health and safety like the factories Act 1934, others includes Dock Laborers Act 1934, Mines Act 1923, Workmen Compensation Act 1923, Provincial Employees Social Security Ordinance 1965, West Pakistan Shops and Establishments Ordinance 1969, Boilers and Pressure Vessels Ordinance 2002, environment related law is PEPA 1997. Industrial sector comes under Factories Act, 1934 but construction, agriculture, fishing sector have not been cordoned by this law. Factories Act, 1934 was enacted before the independence of Pakistan, till now no major amendments have been done in this act. There is an immediate need of the clarification; the language of the act is not specific. The act still looks like a draft or proposal with many question marks. Enforcement of law has been the problem in Pakistan and same is the case with the Factories Act 1934. No government official has been seen at worksite, neither for the data collection nor for the inspection. The officers only come twice at any project, once on stone breaking ceremony and second at the time of inauguration.

Hazards associated to the construction industry are fall from heights, road accidents, manual handling, improper crane operations, collapse of scaffolding, slip / trip / fall, electrocution, improper excavations, welding / cutting, grinding, fumes from paints, house-keeping, deep excavation, camp hygiene, snake bite, hazardous gases and so on. Fall from heights is the most lethal hazard in construction industry. Most of the labourers are unskilled and are careless, they do not bother much about HSE, just because of their lack of interest they do not ask for PPEs and in the end they face injury and even death. Company's management also considers HSE as a burden, they just follow it to fulfill the client requirement.

Respondent accentuated that awareness, legislation and enforcement should be taken seriously by the government of Pakistan. Construction companies should also think about the HSE, these companies should train their staff. This will bring the new business opportunities for the company and will give the company edge over it's rivals. There are no labour unions in the construction industry and wherever they are, they have been politicized and do not work for the betterment of labourers.

4.4. Interview 4

Respondent is working in multinational company. His company's Singapore office has recently won the "Workplace Safety and Health" award. His company is conducting independent HSE monitoring on the projects of various multinational companies of gas sector. In addition to that, respondent's company is also involved in the sustainable designing of petroleum plants and buildings. At the moment, his company is doing construction supervision in several building projects. HSE provisions are vital part of his company's tender and contractual documents.

The respondent further said, although there is no legal binding for the construction companies in Pakistan whether to follow HSE or not but since his company is owned by the American group, that's why they have to fulfill OHSA 1970 U.S. Act requirements. Other construction companies which are working for the local clients and government do not really bother about HSE. No government official has ever inquired construction companies about the HSE issues in their working areas.

Factories Act 1934 covers many issues related to the occupational health and safety but it does not encircle several sectors of business like construction, agricultural and fishing. Actually, factories Act does not clarify specifically which sectors are included and which are not. There is a strong need of amendment in this existing act. Lawmakers and policy makers are not competent in Pakistan; they do not have in depth knowledge about the HSE, same is the case with bureaucrats and parliamentarians. If decisions makers are not competent enough, how can they comment or highlight shortcomings of act. Law enforcement agencies are not effective in implementing the law; government organizations are facing charges of corruption. Police department is one of the most corrupt institutions in the country. The numbers of police officials are not sufficient enough, even numbers of district magistrates who also serve as HSE inspectors of their districts are not sufficient. Each district has one district magistrate and there are many factories and working sites in his jurisdiction that he has to monitor. According to Pakistan Environmental Protection Act 1997, submission of Environmental Impact Assessment (EIA) report is mandatory in order to start work at the site. This EIA report also includes environmental management plan and HSE is an integral part of this plan. However, in many cases EIA report has been submitted after the inauguration of project. It's a general practice in Pakistan that no government representative comes at worksite to inspect whether the contractors are complying the environmental management plan accordingly which they had submitted or not. Moreover, after the 18th amendment in the constitution, federal environmental ministry has been disbanded. Respondent does not know about the research work related to HSE in Pakistan.

There are many hazards associated to the construction industry. These are fall from heights, road accidents, manual handling, improper crane operations, collapse of scaffolding, slip / trip / fall, electrocution, improper excavations,

welding / cutting, grinding, fumes from paints. Among them fall from heights is the most fatal hazard considered in the construction industry. Most of the labourers are uneducated and are careless, they do not concern about the HSE, that's why they don't use PPEs and in the end they face minor and major accidents. Respondent's company has designed the HSE management system for themselves. For each activity, his company does the risk assessment, identifies potential hazards and proposes their mitigation measures. As there is no federal law provisions which are applicable to the respondent's company business, most of the time his company follows the HSE management plan which they have self created. He further told that HSE is not only a practice, it is a thinking as well. Safety is not just a concept, it is a norm. Due to the lack of knowledge, most of the construction contractors in Pakistan do not have HSE management systems. Although, most of the contractors commit that they will follow the HSE rules during the execution of project but this is just a formality. Most of the visits that respondent does are planned visits, as the contractor has prior information about the visit so he arranges PPEs and forces his workers to wear them.

In order to have the improved HSE culture in Pakistan, respondent stressed top to bottom approach, he says government must review existing Factories Act or formulate completely new law. Awareness program should be initiated in the country; government should take steps which encourage the construction companies to implement HSE within their organizations. Government should also strengthen law enforcement mechanism; the concerned institutions must induct competent staff. Construction companies should allocate the HSE budget and should also formulate their own HSE management plan and policy; they should define their own short and long term objectives. All these steps, if considered will improve image of the construction companies not in Pakistan but internationally as well. There is no labour union in respondent's company and wherever they are in Pakistan, they have been politicized and do not work for the betterment of labourers.

CHAPTER 5

5. DISCUSSION

5.1. Main hazards confronted by Pakistani construction workers and how they are affecting them

As mentioned in Section 2.11, table 10 shows that the lifting activity (mechanical hazard) has been a major a cause of workers death while electrocution (physical hazard) has been a second major cause of death during the years 2006 – 2008.

Interviewee 2 has said that "*in the construction sector, most fatal cases are associated to falling from heights. In addition to that slip and fall cases are common in Pakistan*". Interviewee 3 has said that "*hazards associated to the construction industry are fall from heights, road accidents, manual handling, improper crane operations, collapse of scaffolding, slip / trip / fall, electrocution, improper excavations, welding / cutting, grinding, fumes from paints, house-keeping, deep excavation, camp hygiene, snake bite, hazardous gases and so on. Fall from heights is the most lethal hazard in the construction industry*". Interviewee 4 has said that "*there are many hazards associated to the construction industry. These are fall from heights, road accidents, manual handling, improper crane operations, collapse of scaffolding, slip / trip / fall, electrocution, improper excavations, welding / cutting, grinding, fumes from paints. Among them fall from heights is the most fatal hazard considered in the construction industry*". According to interviewees, fall from heights is the major cause of death at worksites. In addition to it, slip/fall (interviewees 2,3,4), electrocution, road accidents, manual handling, improper crane operations,collapse of scaffolding, improper excavations, welding/cutting, grinding, fumes from paints (interviewees 3,4), house-keeping, deep excavation, camp hygiene, snake bite and hazardous gases (interviewee 3) are also cause of accidents in the construction sector. While statistics mentioned in table 10, section 3.2.1.2, signifies lifting activity (improper crane operations), prime movers, transmission, working, rollinf stock on line, rolling stock not on line, person falling (falling from heights), falling object, hand tools, corrosive substance, explosion, fire and electrocution cause of the fatalities in construction sector. Summing up data from interviews and statistics, it can be concluded that falling from heights (interviewees 2,3,4), improper crane operations and electrocution (interviewees 3,4 and table 10) are the top three main causes of the accidents at worksites.

5.2. Health, safety and environment (HSE) department responses to the occupational health and safety hazards

As mentioned in section 2.8, table 5, World Bank – International Finance Corporation HSE Guidelines Report concludes that saddressing OHS issues is the core responsibility of HSE department. HSE departments ensure use of appropriate PPEs, conduct training and awareness programs, assess and evaluates risks and take steps to reduce them, develop standard operating procedures and emergency exit plan and provide medication to injured person at working site.

Interviewee 3 has mentioned that "*in mega projects or donor funded projects like World Bank or multinational companies (O&G, power generation, etc) contractor implements HSE practices to some extent like the use of PPE, reporting, use of safety harness, risk assessments, scaffolding, journey management plan, permit to work, inspections, audits, trainings, toolbox talks, etc*". Interviewee 4 has highlighted that "*his company has designed the HSE management system for themselves. For each activity, his company does the risk assessment, identifies potential hazards and proposes their mitigation measures. As there is no federal law provisions which are applicable to the respondent's company business, most of the time his company follows the HSE management plan which they have self created. He further told that HSE is not only a practice, it is a thinking as well. Safety is not just a concept, it is a norm.*"

After summing up all finidings, it is concluded that the use of PPEs, conduct trainings and programs (interviewee 3, table 5), risk assessment (interviewee 3 and 4, table 5), proposing mitigation measures (interviewee 4, table 5), standard operating procedure, emergency exit plan (table 5) scaffolding, journey management plan, permit to work, audits (interviewee 3) are the major tools HSE department has in response to the occupational health and safety hazards.

5.3. Significance of the HSE department in ensuring sustainability in the construction companies

Section 2.8, table 5 suggests HSE departments look after environmental, communal, OHS and sustainability issues. HSE departments in liaison with other departments ensure sustainable business practices. Sustainable development is a matrix of environment, society and economics and HSE departments already manage environmental and community issues. If finance/accounts department and engineering department support HSE department in implementing the sustainable practices then there will be no obstacle in doing so. For achieving the sustainability, environment-friendly business practices, green designs, usage of green building materials and energy efficient machinery should be opt and for these steps to be taken, cooperation of the finance and engineering department is inevitable. HSE departments also monitor greenhouse gas emissions, carbon footprint, water footprint and energy footprint at sites. They explore opportunities for the water and energy conservation, waste management, noise control and for the wastewater management. They enforce traffic safety plan and ensure secure transport and handling of raw materials. They ensure disease and incident prevention at site by providing personal protective equipment (PPEs) and trainings to workers.

Implementation of International Standards Organization (ISO) standards like Occupational Health & Safety Assessment Series (OHSAS-18001), Environmental Management Systems (EMS-14001), Social Accountability (SA-8000), Energy Management Systems (EnMS-50001) and Sustainable Management Systems (SMS-20121) is an important responsibility of the HSE department.

Since HSE department has a sound knowledge about the implementation of ISO standards, therefore it is their responsibility to formulate the standard operating procedures, conduct air monitoring, maintain OHS related record, conduct safety drills and run safety, environment and sustainability related working sessions. Partly, in acquiring the Leadership in Energy and Environmental Design (LEED) and Building Research Establishment Environmental Assessment Method (BREEAM) certifications, organization needs desired inputs from HSE department.

It is evident in results section that information from interviews and secondary data complements each other. Interviewee 3 has told relatively more hazards than the interviewee 2 and 4. This could be mainly because of the nature of current projects they are working on and the location of their worksites; whereas data in table 10 is more generalized as it is from the secondary source. This also indicates interviewee's general understanding about hazards, potential hazard at one interviewee's jobsite may not be considered as hazard at the other interviewee's jobsite. For instance, interviewee 2 and 4 did not mention house-keeping, deep excavation, camp hygiene, snake bite and hazardous gases as hazards whereas interviewee 3 did. This reflects that interviewee 3 must be working in an area which is prone to the snake bite. Similarly, interviewee 2 has only indicated fall from height and slip/fall. The gathered data from interviewees also reflects the organisational capability and capacity in order to tackle the HSE related hazards, may be interviewee 2 company has overcome all other hazards by means of administrative and technical control measures and now only has to handle the problem of slip/fall and fall from heights.

Here I would like to look for possible reasons why falling from height, improper crane operations and electrocution are the top three main hazards leading to the fatalities. The reason could be lack awareness as construction companies don't bother about the HSE and they don't maintain the HSE department, that's why construction sector of Pakistan still has the problem of occupational deaths and diseases. The reason of deaths due to fall from heights is that most of the construction companies in Pakistan don't install fall arrest system, they don't provide PPEs and communication devices to the workers. These companies don't employee physician at worksites. Most of the crane operators are not licensed and are uneducated; they lack the basic safety knowledge. In most cases, just to save time they overload crane with the demanded material and as a result crane loses its balance, There are no defined routes for vehicles at worksite; most of the vehicles lack emergency brake system and audible warning system that's why improper crane operations is considered as one of the main hazards in the construction sector.. Since labour in Pakistan is illiterate, housekeeping is not practised most of the times. Passages and walkways have construction materials and construction tools in scattered form which causes injuries to the workers.

For research question 2, use of PPEs, conduct trainings and programs (interviewee 3, table 5), risk assessment (interviewee 3 and 4, table 5), proposing mitigation measures (interviewee 4, table 5), standard operating procedure, emergency exit plan (table 5) scaffolding, journey management plan, permit to work, audits (interviewee 3) are the major tools of HSE department to control the occupational hazards. It can be seen that interviewee 4 has only suggested the risk assessments and proporsing mitigation measures. Reason for this opinion could be that

interviewee 4 is working in a consultant company, which mainly supervises the projects not executes them. Interviewee 3 works in a contractor firm, his company executes the project that's why he has proposed many things.

HSE department needs to be more vibrant wherever it exists as national HSE legislation does not bind the construction companies to have HSE department and to report the incidents, construction companies work freely and don't comply with any OHS standards and they don't report the accidents. Government lack awareness about the health and safety issues. OHS issues are not the subject of priority for them. Although, establishment of tripartite council for OHS issues had been suggested in the Labor Policy 2010 but so far no practical step has been taken in this regard by the government. Therefore HSE department has to highlight it's importance every time and should motivate the higher management to invest in HSE department as it's the only defence line against the occupational hazards, construction company has.

In order to tackle the problem related to health and safety, establishment of HSE department is inevitable for enterprises. HSE department has expertise in handling the problems related to OHS. They are trained for emergency operations and could conduct the extensive training programs at work-sites. In addition to it, they can do monitoring of sites and can document all the incidents that are happened at sites. Risk assessment, and hazard analysis are part of their job, on the basis of which OHS accidents can be considerably reduced and will help in formulating or amending the OHS policy and strategy. HSE department not only addresses OHS issues but it also concentrates on the environmental problems. This includes noise test, vehicular emission testing, blood test samples and drinking water and food test on regular basis. Healthy environment is the main safeguard against transmission of diseases.

Similar to sustainable development, HSE is a multidisciplinary subject. HSE department focuses on social and environmental issues. Resource consumption is the key concept in both sustainable development and HSE department. HSE departments encourage use of building materials which are cheap and environmentally friendly and have minimal environmental footprint. During the construction phase, HSE departmensts monitor air and water quality at regular intervals in order to make the working conditions environmental and human friendly. Without the presence of HSE, sustainable construction is not possible.

All four interviewees have also mentioned that in their organizations, they don't have labour unions. Labour unions can play important role in promoting the OHS awareness, as they are well aware of the working environments. The union members are also trained and experienced, they understand OHS specifically from the worker's standpoint, unlike regulatory agencies, OHS practitioners and prevention services, who only contact a minority of workplaces. Generally, substantiation for the effectiveness of labor unions participation on OHS is productive. Union develops and appreciates worker to worker contact. Unions do not highlight the problems only but they are also helpful in implementing the solutions. Unions also defend worker's rights but also see all workers at same level. Unfortunately, In Pakistan, most construction companies do not have labor unions and the companies that do have the labor unions are more of formal kind, working under the strict vigilance of the higher management. There is a need that within organizations, these unions should be set free so that they can play their role effectively in promoting OHS at worksites.

CHAPTER 6

6. RECOMMENDATION

The endorsement of occupational health & safety, as a general progress in working conditions, demonstrates a core approach, not only to secure the betterment of labourers but moreover inspire progressively to competency. Healthy workers are more toned up to have better work stamina, possess higher professional prospects and contribute to enhanced reputated products and services, thereby enhancing the overall worth of life of community and personnels. Thus the criterion for the quality and productivity perfections are safety, health and comfort of working class, and the same are of the chief significance for whole socio-economic, **sustainable development** and just.

In order to second that sufficinet and long-enduring conclusions are achieved in the subject of occupational health and safety, a comprehensive national program focused at accidents prevention that happen while working should be set in place by each state. The strategy will minimize the outlays related with occupational mishaps, and increase efficiency by striving to reduce the origins of hazards intrinsic in work settings.

Awareness, national safety policy and program, effective vigilance, strict occupational health and safety legislation are the only solutions to this problem. Construction companies should be force to follow the agreed set of standards. This tool will enable them to explore new international business opportunities. In addition to that, massive awareness campaigns should be run, to educate labour and employer about occupational health and safety culture. Pakistan is the 9th largest labour force of the world; awareness programs will enhance skillfulness of labours which will eventually increase the foreign jobs opportunities for them.

6.1. Suggestions for Government

- **Amendment in existing Factories Act or formulation of OHS Law**

  There is an eminent need either to reformulate the Factories Act 1934 or to produce entirely new OHS law. In addition to the factories, construction sites should also be included in chapter 3 of Factories Act 1934. As mentioned in American OSH Act 1970 Section 8, British Health & Safety at Work Act 1974, Part III and Australian Occupational Health & Safety Act 1984, Part III, work sites should be made of part of the area of jurisdiction.

- **Hiring of OHS/HSE Inspectors**

  In chapter II of Factories Act 1934, district magistrate has given the right to inspect his district. There are 120 districts in Pakistan (infopak, 2006) and 120 magistrates are not enough to inspect all the factories and construction sites of Pakistan. An amendment is required in chapter 2 in which rights should be given to district magistrate to appoint the district OHS inspectors as per requirements of the district. The appointee must have sound knowledge and experience about OHS issues. He shall inspect the construction sites in his area randomly; collect incident data from construction sites and record non-conformities.

- **Renewal of License**

  In Pakistan, in order to apply for tenders, construction companies must have Pakistan Engineering Council (PEC) certificate. A provision should be made in PEC registration mechanism that the companies who are interested in obtaining or renewing PEC certificate should have OHSAS-18001 and EMS-14001 certifications. Those construction firms should be given more points that have employees who have ISO and NEBOSH certifications.

- **Establishment of OHS Ombudsman**

  There is a need to establish the OHS ombudsman, which maintains the reported incidence records, record complaints about OHS inspectors' misconduct, review provisions of OHS law for improvement and conduct training and skill courses like firefighting courses, first aid and emergency safety drills. This ombudsman could be three tiers: at federal level, provincial level and district level. This ombudsman should have sufficient representation of the industrialist, goverment and entrepreneur. Traditionally in Paksitan, retire judges serve as ombudsmen and they report to senior parliamentarian. They hear the issues of individuals, companies, non governmental organisations, and trade unions.

- **Establishment of HSE Department**

  Companies should be bind to establish the HSE department within their organization. As mentioned before in this research, HSE department plays significant role in reducing site accidents. Companies that have HSE department have less number of reported accidents than the companies who have not got the HSE department. This reflects positive correlation between the HSE department and the incidence rate.

6.2. Suggestions for Enterprises

Since occupational accidents and injuries occur at workarea, cautionary and control moves within the organization should be planned and enforced all together by the proprietor, staff and workers related. These precautionary steps should be based upon well-defined, practical and precise policy. The OHS policy signifies the base from which OHS aims and targets, implementation actions, and other structure elements are fostered. The policy should be in written form and should specify the organizational understandings to guarantee the occupational health and safety (Alli, 2001). Particularly, it should:

- Assign the various roles for OHS within organization,
- Bring policy knowledge to the notice of manager, supervisor and every worker,
- Guide how OHS services are to be conducted, and
- Pinpoint steps to be taken for monitoring of the worksite and worker's health

In order to have safe working site, the management must provide and maintain work locations, machinery and equipment and practice work methods, which are without the risk to health and as safe as practically reasonable (Zimolong & Elke, 2006).

- **Instructions and Trainings**

  Employer should give the necessary instructions and trainings to staff and managers, considering type of work they do or appointed for. Staff should know the incident reporting procedure and basic knowledge on how to protect themselves for occupational hazards. Management should also introduce OHS related programs for HSE supervisors/ coordinators, which include ISO's lead auditor courses and NEBOSH certifications. This will enhance the ability of HSE department.

- **Sufficient Budget Allocation**

  Employer must allocate sufficient budget for the HSE department, so that they can purchase personal protective equipment (PPEs) for staff and could conduct safety drills and extensive training sessions.

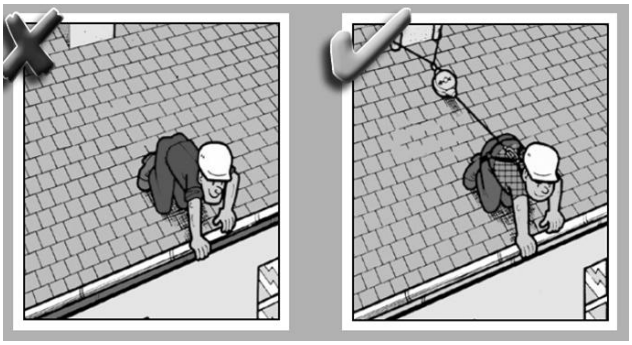
- **Competent HSE Department**

  The size and strength of HSE department should be reasonable; too less people would not perform their jobs effectively while too many people would be an additional burden over the company.

- **Use of Personal Protective Equipment**

  Use of personal protective equipment should be made mandatory. Every worker should know how to wear them and what is the purpose of using them. It has been observed that use of PPE significantly reduces the danger of occupational hazards

Figure 3: Use of Personal Protective Equipment

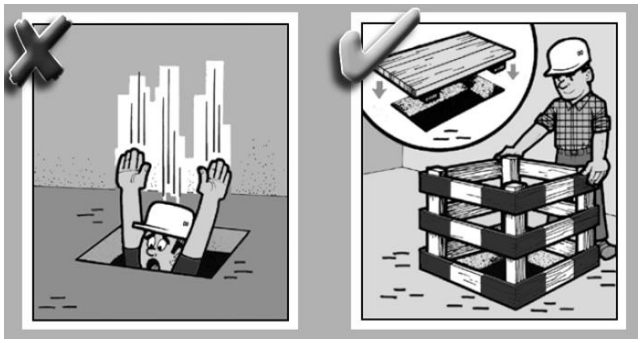


Source: International Social Security Association, 2009

- **Labeling of worksite**

  Work sites should be clear, properly marked and cordoned off. During working hours, first aid box, fire extinguisher and antidote should be made available at worksite. A medical attendant should be present at the worksite.

Figure 4: Labelling of Work-Site



Source: International Social Security Association, 2009

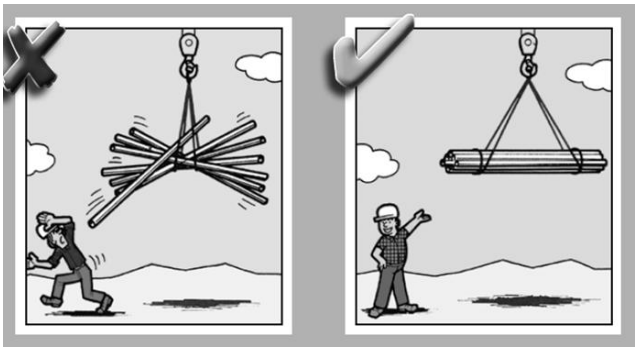
- **Surveillance and Monitoring**

  Unsafe acts and conditions should be recorded on daily basis. In addition to it, any incidence should be reported immediately to HSE/ OHS supervisor. For sensitive machines, standard operating procedures should be provided to worker.

- **Hiring of Crane Operators**

  Management should hire experience crane and fork lifter operators an assistant should be provided to them so that he can do his work more effectively. It should be remembered that the vehicle is ergonomically suitable for the operator.

Figure 5: Handling of Materials



Source: International Social Security Association, 2009

- **Risk Assessment and Hazard Analysis**

  HSE supervisor should conduct risk assessment time to time and should explore methods to minimize risk. Supervisor should try to involve labourers in this activity and should consider their inputs. Housekeeping should be practice on daily basis.

Figure 6: Sorting and Housekeeping

Source: International Social Security Association, 2009

- **Assessment of Safety and Sustainable Culture**

  HSE supervisor should assess safety and sustainable culture of his firm on regular basis. This will aid him to understand the safety ethics, opinions, proficiencies, and patterns of conduct that determine the commitment of organization towards OHS and sustainable issues. Safety culture also includes and situational outlooks, psychological outlooks and behavioral outlooks of organization.

- **Permit to Work**

  Permit to work is another good practice that should be enforce in organization. There are several kinds of activities like working at heights, excavation, welding, crane operations, electrocution etc. which are more potentially hazardous than the others. These activities should be conducted cautiously under the observation of HSE supervisor and the records of these activities should be maintained separately. Permit to work provides key information about the hazards that are associated with the respective activity and about appropriate PPE that should be dressed while conducting that activity. It also suggests necessary precautions that should be taken before, during and after the execution of that particular activity.

6.3. Suggestions for Workers

- **Health and safety of other people**

  Workers should take sound care for the health and safety of fellow workers and other people (visitors) at the worksite that may be affected by the workers conduct. This can be achieved by working safely, utilizing and retaining plant and equipment correctly, and ensuring that their worksite is hazard free.

- **Ensuring Cooperation**

  Workers must oblige fully with the employer in any step that the employer takes or proposes in order to ensure safety. This can be done by reporting hazards and incidents, using correct PPEs during work, doing work in a safe way, obeying the health and safety instructions and standard operating procedures, and attending the safety sessions.

- **Establishing Workers Union**

  Workers unions can play significant role in promoting workers rights. Workers unions serve as a platform where every worker can speak and can propose the joint action strategy for his and his fellow workers rights. Acting as a single unit is more influential than acting alone.

6.4. Conclusive Remark

The current study reflects that the situation in the Pakistani construction sector is very alarming. Lack of awareness, ineffective legislation and weak enforcement are the prime factors that have contribute to the situation in Pakistan. The current government, like its predecessors, has announced the Labor Policy 2010, and just like its predecessors, no actions have been taken yet. This attitude encourages construction companies to not bother about the occupational health and safety concerns and these companies then do not report accidents to government officials.

The results of this study clearly reflect that occupational health and safety conditions are not good. Numerous hazards have contributed to the deaths of construction workers. Falls from heights, electrical shocks and improper crane operations can be pronounced as the most deadly hazards. In addition to these hazards, there are several other health and safety hazards that are faced by the construction workers, such as exposure to dust and toxic materials.

At the enterprise level, establishing HSE departments is the key solution to this problem. HSE departments play significant roles in controlling occupational incidents by promoting occupational hazard awareness, formulating guidelines and working procedures, and by inspecting worksites. HSE is also a key part of sustainable construction, for practising sustainable construction, contributions from HSE departments are required for the sustainable as the HSE staff not only inspect the worksites but also monitor the environment.

For any enterprise, irrespective of size, investment in safety and occupational health programs is profitable as the cost of setting this program would be much less than the cost that companies have to pay in compensation or in improving their image after a mishap. The investment would open the doors for new business opportunities as the company's impression would be more affirmative than ever before. Companies should not see occupational health and safety programs as a burden or prerequisite, instead they should come up with these sorts of programs by their own will and interest. There will a certain increase in efficiency and workers well-being if comprehensive health and safety management policy with leadership commitments are fortified.

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