

CONSTRUCTION SAFETY AND MANAGEMENT PRACTICES IN  
BANGLADESH

MD SHAMIM HASAN SARKAR

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*This project report is dedicated to my parents, my wife and my family for  
their endless support and encouragement.*

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## **ABSTRACT**

Bangladesh is experiencing a building construction boom. At present there is a culture of high rise buildings, foot over bridge, building construction and repair of roads, placing of utility services etc. and it seems that the city is in building construction frenzy although it indicates the continuous development of the country. Unfortunately, it is done in a very careless and unprofessional manner without the safety practices. The aim of this study is to present the safety issues in construction practices and it focuses on the existing safety scenario in the construction sites. The main objective of this study is to collect the accident data to study and analyse the safety issues of construction practices. The study is carried out by questionnaires and interviews. A total of 150 questionnaires was distributed to 30 construction sites of Dhaka city in Bangladesh. The respondents were site engineers, project managers, contractors and workers/ labours. The collected data is analysed using the frequency analysis. From the study it was found that, safety equipment, in general, are not adequate both in terms of quantity and quality in construction site. Considering manpower, most of the workers are not trained about safety and management practices in construction site. Along with the general observations, a case study of 'Rana Plaza' disaster is also highlighted in this project.

## ABSTRAK

Bangladesh sedang mengalami ledakan pembinaan bangunan yang pesat. Pelbagai jenis pembinaan yang dijalankan seperti bangunan pencakar langit, perumahan, perindustrian, jejantas dan kerja-kerja pembaikan jalan raya. Ini menunjukkan bahawa sector pembinaan akan menjadi sector yang terpenting untuk Negara Bangladesh. Malangnya, pembangunan ini dijalankan tanpa mengambil berat dasar-dasar keselamatan dan tidak professional. Tujuan kajian ini dijalankan adalah untuk membentangkan isu-isu keselamatan dalam kerja-kerja pembinaan dan senario keselamatan sebenar di tapak pembinaan diberikan tumpuan. Objektif utama kajian ini adalah untuk mengumpul data kemalangan untuk mengkaji dan menganalisis isu-isu keselamatan amalan pembinaan. Kajian ini dijalankan dengan soal selidik dan sesi temubual. Sebanyak 150 set soal selidik telah diedarkan kepada 30 tapak pembinaan di bandar Dhaka, Bangladesh. Responden adalah jurutera tapak, pengurus projek, kontraktor dan pekerja / buruh. Data yang dikumpul dianalisis dengan menggunakan analisis kekerapan. Dari kajian ini didapati bahawa, peralatan keselamatan secara umumnya tidak mencukupi dari segi kuantiti dan kualiti di tapak pembinaan. Memandangkan tenaga kerja, kebanyakan pekerja tidak terlatih mengenai amalan keselamatan dan pengurusan di tapak pembinaan. Bersama-sama dengan ini pemerhatian umum kajian kes bencana 'Rana Plaza' juga diketengahkan dalam projek ini.

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**LIST OF ABBREVIATIONS AND SYMBOLS**

BLA	Bangladesh Labour Act
BNBC	Bangladesh National Building Code
ILO	International Labour Organization
LFS	Labor Force Survey
NHA	National Housing Authority
OSHE	Occupational Safety, Health and Environment Foundation (Bangladesh)
RAJUK	Rajdhani Unnayan Kattripakkha (Capital Development Authority)
REHAB	Real Estate and Housing Association of Bangladesh

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## **CHAPTER 1**

### **INTRODUCTION**

#### **1.1. General**

The Construction industry stands out from other employments as having one of the highest worker injury and fatality rates, Construction comprise a very small percentage of the overall workforce. Yet, the incidence rate for both fatal and non-fatal accidents causing death, injuries and illnesses exceeds that of many other industries. The construction industry has the most fatalities of any other industry sector for many countries of the world and currently for Bangladesh its fatality rate is the second largest only falling behind the garments sector. Many studies have shown that a fairly large percentage of construction accidents could have been eliminated, reduced, or avoided if simple safety techniques and practices were applied at the sites and the workers were trained and made aware of the safety hazards present in the sites. Also addressing construction safety in the design and planning phase, can have a substantial impact on reducing injuries and the cost associated with safety related project delays.

Construction safety (the intermediate phase between a finished design and a completed building) is largely the responsibility of the owner/developer/contractors and other site professionals. The success of a project depends on the intricate planning and decisions regarding safety measures that are made on site. Most construction accidents result from basic root causes such as lack of proper training, deficient enforcement of safety, unsafe equipment, unsafe methods for sequencing, unsafe site conditions, not using the safety equipment that was provided, and a poor attitude

towards safety (Toole, 2002). Often times these safety measures are grossly neglected and safety laws are violated in the sites causing undue fatalities.

## **1.2. Problem statement**

Bangladesh Occupational Safety, Health and Environment Foundation (OSHE) collect the workplace accident report based on monitoring sixteen leading national daily newspapers of the country and reports of its field offices in different parts of the country.

National newspapers and local newspapers are other source of collecting information on workplace accidents, death and injury of workers. But the limitation is, it only covers news of big accidents followed by death and critical injury. Since 2005, OSHE has been engaged on workplace death and injury monitoring of 16 national daily newspapers and sharing the finding with government, trade unions, employers and other stake holders. But it's not possible to get the accurate statistics only from the newspaper because most of the accidents are not reported to the media.

The lack of safety knowledge, lack of proper supervision and enforcement of building codes and regulations are the main problems for the accidents in construction site. Construction companies, employers, workers, common people no one is concern and aware about the safety issues in construction practices. There is a huge lack of specific rules, regulations and proper guidelines related with safety issues in construction practices in Bangladesh.

### **1.3. Aim and objective**

Main objective of this project is to shed light into existing safety climate of building construction sites in Bangladesh and to find ways to improve the overall situation.

The objectives of the study are as follows:

1. To study the safety related issues of building construction sites in Bangladesh.
2. To overview the safety practices and fatalities in the construction sector.
3. To suggest recommendations for improvement in future of safety issues in construction practices in Bangladesh.

### **1.4. Scope of the study**

The study is carried out in Dhaka, Bangladesh and construction sites are visited randomly to visualize the actual condition of safety environment in building construction sites. The researcher focus on identification of accidents in construction site related with safety issues. The study is carried out based on data collected from the questionnaires.

## **1.5. Structure of the dissertation**

The dissertation report is arranged among five chapters. An outline of the different chapters is given below:

### Chapter 1: Introduction

A brief introduction of the building construction safety and management practices are provided in the first chapter. The problem statement, objectives, scope of the work are also outlined in this chapter.

### Chapter 2: Literature review

Gives a brief review of literature relevant to construction industry and safety both in the context of Bangladesh and the global framework. Also provides overall statistical data related to the construction safety performance scenario both locally and globally and a comparison of application of Occupational Safety and Health (OSH) legislation in various countries.

### Chapter 3: Research Methodology

This chapter discuss in detail the research procedures, manner in which the data were collected followed by how the data was processed and analyzed to achieve the aim and objectives.

### Chapter 4: Data Analysis and Results

This chapter focuses on the safety related issues of building construction sites and various safety measures adopted in construction practices in Bangladesh by analyzing the collected data.

## Chapter 5: Conclusion and Recommendations

Finally this chapter draws out a conclusion for this study and suggests some recommendations for the improvements of construction safety and management practices in Bangladesh which is one of the objective of the study.

## REFERENCES

- Ahmed M.Z., Siddiqui M.S.A, Khan M.S. (2012), “Reliability and Construction Practices in Building Construction Industry of Bangladesh”, Third International Conference in Developing Countries (ICCIDC-III), Bangkok, Thailand.
- Al Palumbo, “Safety in Design: Enhancing Construction Safety by Implementing Safety in the Design Phase” Construction Management, The Hirani Group Jericho, NY COM eJournal.
- Amin A.T.M.N., Bhuiyan M.S.R., Faruq O. and Sultana S. (2013), “Informal Employment Practices in Bangladesh’s Construction Sector and Opportunities for Formalization.” A publication by ILO (International Labour Organization), Final Report 08 December, 2013.
- Attallah, I. (2014). The Rana Plaza Incident: The Right to Remedy.
- Bangladesh Bureau of Statistics (BBS), Labour Force Survey (LFS), 2003, 2006, 2010 and 2013.
- Behm, M. (2005), “Linking Construction Fatalities to the Design for Construction Safety Concept” Safety Science 43 589-611.
- BNBC (2006), “Bangladesh National Building Code 2006”.
- Chanda S.K. and Ahmed M. (2008), “Safety Management during Building Construction in Dhaka City”. An undergraduate thesis submitted to the Department of Civil Engineering, Bangladesh University of Engineering and Technology, Dhaka.



- Chowdhury M.M.I and Islam M.M. (2011), "Construction Practices and Safety Related Issues in Building Construction of Dhaka City". An undergraduate thesis submitted to the department of Civil Engineering, Military Institute of Science and Technology, Dhaka.
- Dewri L.V (2012), "A Comprehensive Study on the Real Estate Sector of Bangladesh". Real Estate and Housing Association of Bangladesh (REHAB), July 12, 2012.
- Farooqui R.U., Arif F. and Rafeeqi S.F.A (2008), "Safety Performance in Construction Industry of Pakistan". Proceeding of the First International Conference on Construction in Developing Countries. Advancing and Integrating Construction Education, Research and Practice, August 4-5, Karachi, Pakistan.
- Faruque A.A. (2009), "Current Status and Evolution of Industrial Relations System in Bangladesh". International Labour Organization.
- Ferdous A. (2012), "Construction workers' safety neglected". The Daily New Age.
- Foyez A. (2013), "Most buildings since 2009 in Dhaka have no fire approval". The Daily New Age.
- FPD (October 25, 2011), "2<sup>nd</sup> Round Table Discussion on Occupational Safety and Health in Construction Sector", Forum for Physical Development of Bangladesh.
- Gambatese J., Behm. M., and Hinze J. (2005), "Viability of Designing for Construction Worker Safety". Journal of Construction Engineering and Management. September 2005.
- Gambetse J., Hinze J. and Haas C. (1997), "Tool for Design for Construction Worker Safety". Journal of Architectural Engineering, March 1997.
- Guha H., Biswas P.P. (2013), "Measuring Construction Site Safety in Kolkata, India", International Journal of Scientific & Engineering Research, Volume 4, Issue 5, May 2013.

- Hasan K.M.M, Ahmed I.U. and Zaman M.R. (2008), “An overview of Safety Management of Building Construction in Dhaka City, its lacking’s and probable way out to improve upon”. An undergraduate thesis submitted to the Department of Civil Engineering, Military Institute of Science and Technology, Dhaka.
- Health and Safety Executive (2013), “Statistics on Fatal Injuries in the Workplace 2012/13; Full-year details and technical notes”.
- Hecker S., Gambetse J., and Weinstein M. (2005), “Designing for Worker Safety”, Professional Safety.
- Hossein M.Z. and Hasan A.K.M.M (2007), “Irregularities in Building Construction Works and Safety Related Issues in Dhaka City.” An undergraduate thesis submitted to the Department of Civil Engineering, Military Institute of Science and Technology. Dhaka.
- Huda (2013), “Construction Workers lose lives as Safety Issues overlooked in Government funded Projects” The Daily Financial Express.
- International Labour Organization (2005), “Facts on safety at work”.
- Mahmud A.H. (2007), “Corruption in Permission Process in RAJUK: A Study of Violations and Proposals”. A report published by Transparency International Bangladesh.
- Manik, J., & J. Yardley, J. (2013). *Building Collapse in Bangladesh Leaves Scores Dead*.
- Mroszczyk J.W. (2006), “Designing for Construction Worker Safety”. Designing for Construction Worker Safety workshop, Session 750, Seattle.
- “Occupational Safety and Health Statistics Bulletin” Issue No. 13 (2013), Occupational Safety and Health Branch, Labour Department, Hong Kong.
- OSHE (2009), Draft Sectoral Profile “Occupational Safety and Health Profile of Construction Sector”. Developed by: Bangladesh Occupational Safety, Health and Environment Foundation (OSHE).

- Priyadarshani K., Karunasena G. and Jayasuriya S. (2013), "Construction Safety Assessment Framework for Developing Countries: A Case Study of Sri Lanka". *Journal of Construction in Developing Countries*, University Sains Malaysia.
- Raheem A.A., Hinze J., Azhar S. (2012), "Injury/ Fatality Data Collection Needs for Developing Countries". *Third International Conference on Construction in Developing Countries (ICCIDC-III) "Advancing Civil, Architectural and Construction Engineering & Management"*, Bangkok, Thailand.
- Raheem A.A., Hinze J.W., Azhar S., RIyaz Z., Chowdhury R. (2011), "Comparative Analysis of Construction Safety in Asian Developing Countries", *Sixth International Conference on Construction in the 21<sup>st</sup> Century (CITC-VI)*, Kuala Lumpur, Malaysia.
- Saver Tragedy: DCH Observation & Recommendation. (2013).
- Shafi S. A. (2010), "National Building Code and Its Implementation". Keynote paper on Round Table Discussion on Implementation of National Building Code, Bangladesh.
- Sinha, A., Islam, A., & Raju, R. (2013). *An Investigation of Recent Building Collapses Around the World with Special Reference to Rana Plaza*.
- Smallwood J., (1996), "The Influence of Designers on Occupational Safety and Health", *First International Conference of CIB working Commission W99*, Lisbon, Portugal.
- Syfe Z. (2007), "Investigation of Safety Related Issues in Construction Sites of Dhaka City." An undergraduate thesis submitted to the Department of Civil Engineering, Bangladesh University of Engineering and Technology, Dhaka.
- Tam C.M., Zeng S.X., Deng Z.M. (2003), "Identifying Elements of Poor Construction Safety Management in China", *Safety Science* 42.
- Than, K. (2013). *Bangladesh Building Collapse due to Shoddy Construction*.

- Toole T. M. and Gambatese J. (2008), “The Trajectories of Prevention through Design in Construction”. *Journal of Safety Research* 39 (2008), National Safety Council and Elsevier Ltd.
- Toole T.M. (2002), “Construction Site Safety Roles”, *Journal of Construction Engineering and Management*.
- Zahra J.T. and Hosseinian S.S. (2012), “Designing for Construction Workers’ Safety”, *International Journal of Advances in Engineering and Technology*, Volume 4, Issue 2.
- Tusher M.K.B and Mohiuddin S.B. (2010), “Safety Related Issues of Building Construction Sites in Dhaka City.” An undergraduate thesis submitted to the Department of Civil Engineering, Military Institute of Science and Technology, Dhaka, Bangladesh.
- Zohar D. (2003), “Safety Climate: Conceptual and Measurement Issues”. *Handbook of Occupational Health Psychology*, Washington D.C., American Psychological Association.
- Zohar D. (1980), “Safety Climate in Industrial Organizations: Theoretical and Applied Implications”. *Journal of Applied Psychology* 65(1).