

Faculty of Cognitive Sciences and Human Development

The Environmental, Organizational and Individual Factors Contributing to Unsafe Situations at Workplace: A Case Study on Housing Construction Industry in Bangladesh

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The Environmental, Organizational and Individual Factors Contributing to Unsafe Situations at Workplace: A Case Study on Housing Construction Industry in Bangladesh

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DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Malaysia Sarawak. Except where due acknowledgements have been made, the work is that of the author alone. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any other degree.

……

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ABSTRACT

This study explores the environmental, organizational, and individual factors that contribute to unsafe situations as well as how they contribute to workplaces in Bangladesh housing construction industry. The construction industry is important to Bangladesh's economy, yet remains as risky due to its frequency and magnitude of accidents. However, the understanding of an unsafe situation, particularly in the housing construction industry is mostly confined to compliances, labor force's skill and application of PPE. Therefore, to obtain a comprehensive understanding, the study adopts a case study design and obtains data through the in-depth interview with fifteen purposely sampled individuals who are directly and indirectly connected with the housing construction industry in the sample location of Dhaka city. The study used thematic analysis with predefined themes from the Open System Theory to explore the factors and finds sixteen factors contributing to unsafe situations.In contributing to unsafe situations, four organizational factors emerge as well: cost guided process decisions, inappropriate administration of incentives, Inefficient project management and lack of practice of learning in the organization. Besides, perceived acculturative challenges, a dire need for money generation and safety adverse group norms are explored as the individual factors contributing to unsafe situations. The study also used narrative analysis to explore how these factors contribute to unsafe situations and present three scenarios to depict how they contribute. These findings address the present knowledge gap, therefore, enhance the present understanding of unsafe situations at workplaces in Bangladesh housing construction industry. These findings also facilitate in formulating and in taking appropriate initiatives at the environmental, organizational and individual levels to protect the workplaces from unsafe situations.

Keywords: Environmental factors, organizational factors, individual factors, unsafe situations at the workplace and Bangladesh housing construction industry

Faktor Persekitaran, Organisasi dan Individu yang Menyumbang kepada Situasi yang Tidak Selamat di Tempat Kerja: Kajian Kes Mengenai Industri Pembinaan Perumahan di Bangladesh

ABSTRAK

Kajian ini meneroka faktor alam sekitar, organisasi, dan individu yang menyumbang kepada situasi yang tidak selamat serta bagaimana mereka menyumbang kepada tempat kerja di industri pembinaan perumahan Bangladesh. Industri pembinaan antara sektor penting dan menyumbang kepada ekonomi di Bangladesh tetapi industri pekerjaan ini kekal sebagai berisiko disebabkan masih banyak berlaku hal-hal kecemasan dan kekerapan kemalangan di dalam industri pekerjaan ini. Bagaimanapun, pemahaman mengenai situasi tidak selamat terutama dalam industri pembinaan rumah kebanyakkan terhad kepada pematuhan, kemahiran tenaga kerja dan penggunaan PPE. Oleh itu, untuk mendapatkan pemahaman yang komprehensif, kajian ini menggunakan reka bentuk kajian kes dan mendapatkan data melalui temubual mendalam dengan lima belas individu berkaitan dengan industri pembinaan di bandar Dhaka. Kajian ini menggunakan analisis tematik dengan tema yang telah ditetapkan dari Teori Sistem Terbuka untuk meneroka faktor-faktor dan mendapati enam belas faktor yang menyumbang kepada situasi yang tidak selamat. Dalam menyumbang kepada situasi yang tidak selamat, empat faktor organisasi juga muncul iaitu: keputusan proses berpandu kos, pentadbiran insentif yang tidak sesuai, pengurusan projek yang tidak cekap dan kurang amalan pembelajaran dalam organisasi. Di samping itu, cabaran-cabaran akulturatif yang dirasakan, keperluan yang sangat diperlukan untuk penjanaan wang dan norma-norma kumpulan buruk keselamatan diterokai sebagai faktor individu yang menyumbang kepada situasi yang tidak selamat. Kajian ini juga menggunakan analisis naratif untuk meneroka bagaimana faktor-faktor ini menyumbang kepada situasi yang tidak selamat dan mengemukakan tiga senario untuk

menggambarkan bagaimana mereka menyumbang. Penemuan-penemuan ini menangani jurang pengetahuan yang ada dan meningkatkan pemahaman sekarang tentang situasi yang tidak selamat di tempat kerja di industri pembinaan perumahan Bangladesh. Penemuan ini juga memudahkan dalam merumus dan mengambil inisiatif yang sesuai di peringkat alam sekitar, organisasi dan individu untuk melindungi tempat kerja dari situasi yang tidak selamat.

Kata kunci: *Faktor persekitaran, faktor organisasi, faktor individu, situasi yang tidak selamat di tempat kerja dan industri pembinaan perumahan Bangladesh*

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LIST OF ABBREVIATIONS

BDT	Bangladesh Taka
BNBC	Bangladesh National Building Code
BSTI	Bangladesh Standard and Testing Institute
FCSHD	Faculty of Cognitive Sciences and Human Development
IEB	Institution of Engineers, Bangladesh
OST	Open System Theory
PPE	Personal Protective Equipment
RAJUK	Rajdhani Unnayan Kartripakkha
TVET	Technical and Vocational Education and Training

CHAPTER 1

INTRODUCTION

1.1 Introduction

This study focuses on factors contributing to unsafe situations at workplace for housing construction industry in Bangladesh. This chapter discusses the inadequacies or discrepancies observed in knowledge area that necessitate further inquiry in mentioned context. The chapter also covers potential contribution of the study, definition of terms that are used throughout the study. The importance of structuring this chapter remains in the highlighted reasonability and consistency for conducting the study.

1.2 Background of study

Numerous literatures like Williams (1998), Molineux (2010), Dennhardt and Rudman (2012), Hocking (2014), Friend and Kohn (2018) acknowledge that the individual's choice for occupation is contextual and predominantly focuses on his survival and sustenance; in engaging occupation, however, every individual is susceptible to unsafe situation of any form regardless the duration of engagement. Therefore, MCKinnon (2014) and Friend and Kohn (2018) note, human civilization inherits very long-standing concern of self-protection and that brings into the idea of safety in occupation as early as four millennia from today.

O'Neill, Martinov-Bennie and Cheung (2013) and Robertson et al. (2015) note, constant dynamics of technology and work practice are repeatedly generating unique occupational risks and hazards. Alongside, Wahab, Rajab, Shaari, Rahman and Saat (2014) and Senouci, Al-Abbadi and Eldin (2015) concern, despite of the significant responsiveness is addressed to safety initiatives at workplaces, occupational mishaps affect

twenty-one workers in every minute globally. As consequences, there are social affliction, downfall in work efficiency, loss of time and resources from shifting of work schedule, and additional activities like investigations that consume work-hour.

The undesired situation that outcomes injury and illness to individual and losses to property is outlined by Kenett and Raanan (2011) as accidents. And, accidents can be prevented in effectively, as Hudson (2014) suggests, if counteractive actions are taken on the recognized underlying causes; thus, the focus for searching for causes of accidents has century long history, since the work of Greenwood and Woods (1919).

Recently, in exploration of accident causation pattern through accident causation reports, for Andalusian manufacturing sectors on accident investigation reports, Carrillo-Castrillo, Rubio-Romero, Onieva, and Lopez-Arquillos (2016) finds out diverse active and latent under the cluster of personal factors, safety management, work organization, material and substance, equipment, machinery, installation and workplaces. On the other hand, in China, Rau et al. (2018) identifies the personality factors of individuals connected with elevator accidents wherein conscientious and agreeable personality is more conforming to regulations.

Literatures like Awwad et al. (2016), Williams, Hamid and Misnan (2017) and Ahmed, Shaukat, Usman, Nawaz and Nazir (2018b) mention of construction industry as a major contributor to economy in nations worldwide, yet, remains as one of the sectors accounting high rates of occupational accidents and injuries. Due to its economic importance and high accident rates, this industry gains focus in significant number of studies in understanding accidents. Particularly, in Pakistan, Zahoor, Chan, Gao and Utama (2017), in their qualitative study finds factors like extensive subcontracting, unsuitable and incompetent managerial decisions, insufficient enforcement, underprovided training and

resources, short in awareness that potentially influence accidents Pakistani construction industry. On the other hand, in Brazil, the qualitative study by Gomes, Arezes and Vasconcellos (2016) finds the existence of safe state for working in the construction industry is subjected to perception of work, variation of understanding of rules with changing sizes of firm, discrepancies in public policies. As causal factors of accidents in the building construction sites, Williams, Hamid and Misnan (2017) points towards building design, its client, contractor, construction and operatives, as well as site factors.

In Bangladesh context, in mixed methodology, Rahman et al. (2015) finds noncompliance, unskilled labor and insufficiency of PPE as factors affecting safety in construction industry. On the other hand, on the same context, Ahmed, Sobuz and Haque (2018c) locates 18 factors behinds accidents for construction industry; those include, ignorance, negligence, carelessness and risk taking behaviors from both worker and supervisors, inadequate management safety specific commitments and co-ordination, inadequate vigilance from law enforcement agencies, climate condition, inconsistent project scheduling.

However, Literatures like Tah (2009) and Walker (2015) denote construction industry as complex adaptive system in interactions with the environment it functions. And for a complex adaptive system, Dekker (2011), Roughton and Crutchfield (2014) and Dekker (2015) understand that unsafe situations occur as combined consequence interacting components of a system and that occurrence can be understood if how elements as integrated in the larger system act on work process is understood.

1.3 Research problem

Ahmad, Usop, Ismail, Bujang and Mansor (2014) and Dine, McGaghie, Bordage and Shea (2015) specify problem statement as the indispensable element of the study as it

presents the issues and context of the study by summarizing current concern and leads how study may address it. Moreover, problem statement indicates the originality and distinctiveness of the research outcome addressed from conceptual, empirical and practical aspects on the specific issue.

The Continuous demand of habitat, workplaces, infrastructures, and other establishments directs rapid growth of construction market; as of Awwad, Souki, and Jabbour (2016), eventually, construction industry contributes to national economy significantly everywhere worldwide. As of Senouci et al. (2015), Seo, Lee, Kim and Jee (2015), Hallowell and Yugar-Arias (2016), Wang, Zou, and Li (2016), unlike other industries, this industry is about unique project, involvement of temporary workforces, decentralized work sites and highly labor sensitive activities. Besides, the frequent encounter with hazardous equipment, situation and material the inadequacy of co-ordination and simultaneous multi-traded works at the same place frequently develop unsafe situation in this industry.

On the other hand, Robertson, et al. (2015), Carayon et al. (2015) and Niskanen, Louhelainen and Hirvonen (2016) understand safety as emergent system properties evolved from the interaction of system components and the absence of incidents do not ensure safety at all. However, early occupational safety research of Greenwood and Woods (1919) to later works like Heinrich (1931) to recent studies like Ness (2015), Viramuthu (2017), Gravina, Cummins and Austin (2017) and McSween and Moran (2017), the concept of causation of accidents is founded on limited factors, in particular on human error as a predominant cause in various context.

On the other hand, Wiegmann and Shappell, (2017) holds that accidents can neither be attributed to a single cause nor to a single individual and criticizes the notion accidents

being caused by 70-80 % of human errors as excessively simplistic to qualify as an approach of any accident causation. Hudson (2014) and Reason (2016) holds that accidents are originated from complex and irregular arrangements of stances that are unique in every case. Literatures like Besnard and Hollnagel (2014), Dekker and Pitzer (2016), Sherratt (2016), Woods, Dekker, Cook, Johannesen and Sarter (2017), and Simpson and Horberry (2018) also point that human error is not just a random occurrence yielded from vacuum, it is a symptom of intense system defect. Thus, pointing solely on individuals' action at the immediate or adjacent layer of the occurrence results unreliable prediction, thus, unproductive or counterproductive interventions. Moreover, accidents being of complex dynamics, the causation is not consistent to be too simplistic to be a single factor or single human entity.

A system cannot be disintegrated into smaller dimension for simpler understanding; as of Tweedy (2014), Dekker (2015), Dekker (2017, p.23) and Woods et al. (2017), the system behaviors cannot be explained directly because of the individual agents' behaviors; and a holistic inclusion of the components is required to comprehend system behavior. Therefore, accidents and incidents are the circumstances that causes harm to human and circumstances that has the potential to harm respectively; as of Vincoli (1994), Dodson (2016) and and Friend and Kohn (2018), non-prejudiced and non-judgmental attitude to view both these events facilitate the veracious learning on warnings, situations and contributing factors without paying much price for any losses.

1.3.1 Theoretical evidence

Maxwell and Chmiel (2014, p.21-22) understands theory as understanding of particular phenomenon however "every theory is partial and incomplete". In relation with prediction of accidents by models in construction industry; as of Grant et al. (2018, p.99),

Winge and Albrechtse (2018), the construction industry is not homogeneous and the nature and causes of accidents varies widely in terms of type, size, phase, complexity and context of the project, thus, “various models exist, none is yet universally accepted, but elements of different models are”.

In particular, Dekker (2014) criticizes earlier models like Domino theory of accident causation that is instituted on the assumption of chain of event. This dictates a linear series of errors or violation to take the system to fall to the last domino and causes accident, mostly accounted by unreliable human participant as slips and procedural breach. On the other hand, modern concept of accident causation like Swiss Cheese Model, as of Coze (2013) and Guo et al. (2016) complain, is based on presupposition of failure (dormant or active) and inherits the conception of blaming the close or distant participants as well as being inadequate in explicit elucidation on segregating defense areas by psychosomatic, managerial or social aspects. Dekker (2011, p.58 and 77) disapproves it as “still very Newtonian” for the notion of “lining up” organizational deficits and unsafe acts leads to “componential, linear parsing-up of a system”. Underwood and Waterson (2014) points that a system involves complexities; thus, accidents are not simply resulted from the trigger events. The tradition of sequential linear cause and effect form turns inadequate enough to obstruct understanding accidents.

Carayon et al. (2015) acknowledges that system approaches require addressing the perspectives of system interface, system interaction and cross level interactions in understanding safety and proposes model of sociotechnical system for workplace safety that takes in work context, socio-organizational context and external environment in concentric layers rather than hierarchical. As of the model, external layers’ elements influence safety through adjacent and distant layers; that is, environment influences

organization and organization influence individual. This is quite contradictory with literatures like Bess and Dee (2012), Liu, Meng and Fellows (2015), Habibnezhad and Esmaeili (2016) and Flynn, Castellanos and Flores-Andrade (2018) as these literatures hold that environment has influence on shaping individuals' perception to view and responses to the world including safety. Moreover, the model indistinctively specifies the internal and external environment and how the internal or external agents possibly influence safety in proximal and distal layers remain unnoticed. These gaps necessitate the requirements to explore the environmental, organizational and individual factors contributing to unsafe situations and how they contribute directly and indirectly in workplace.

1.3.2 Empirical evidence

In identifying key factors influencing safety performance for Cambodian construction industry, Durdyev et al. (2017) acknowledges that safety-limiting factors persist in various sociocultural, legislative and regulatory environments within which construction industry is operated. Even though, the study finds management and organization, resources, site management, cosmetic (ineffectiveness of safety policies, poor legislation, adverse weather, inadequate insurance compensation) and workforce as contributing factors, the factors of sociocultural, legislative and regulatory environment in connection with limiting safety do not appear distinctively.

Similar study on the context of Pakistan by Zahoor et al. (2017) acknowledges existence of macro, meso, and micro levels of factors contributing to unsafe situations. The study finds that the management-oriented factors are more in prominence than worker related factors in contribution to accidents. This qualitative study finds inadequate enforcement, great dependency on subcontracting, inappropriate management decision making, managerial incompetency, insufficient training, scarcity of resources, absence of

awareness in worker and unsafe behavior as factors influencing to accidents. Even though, this study identifies upstream precursors and refers as meso factors they are just limited within organizational boundary. Therefore, how factors outside of the organization contribute to unsafe situations remains unknown in the study.

On the other hand, Bristol and Scott (2014) and Huanga and Crotts (2019) explain that, the expectation and preference of an individual is deeply rooted in shared sociocultural value system. Liu, Meng and Fellows (2015) and Habibnezhad and Esmaeili (2016) note risk perception, or the level at which individual accept risk, depends on how note worthily the risk is acknowledged, particularly the degree of a persons' acceptance of unjustified risk is subjected to social environment including national background.

In recent meta-analysis, Winge et al. (2019) acknowledges construction industry as a socio technical system and explores the causal factors and connections in construction accidents. The study applies secondary accident data and identifies seven factors related to individual and organization. However, the factors are immediate to individuals and their actions; the study also overlooks the societal components in proximal or distal relation to individual workers' activities. Similar inadequacies are observed in the study on Chinese construction as well. Liao et al. (2018) observes association-based characteristics of hazard; even though, the study acknowledges that accidents are not independent events, thus includes topology of antecedent to enhance the understanding; however, this study does not include external factors within network for identifying precursors of accidents.

Apart from this, literatures like Stergiou-Kita, et al. (2015) and Nielsen et al. (2015) interprets the personality attributes with risk taking and associate extent of masculine perception with risk taking for the high-risk industries like construction. Pourmazaherian, Baqutayan and Idrus (2017) also proposes that personality traits like high agreeableness

and conscientiousness yields greater safety for construction industry. However, Glendon and Clarke (2016) firmly hold that it is quite impractical to construct a specific accident-prone personality. Therefore, there remains a contradiction among in understanding human factors with unsafe situation.

Besides, in discussing the capability of qualitative researches, Silverman (2017, p.133) indicates that the qualitative inquiries suitably attend the phenomenon in terms of 'what' and 'how' aspects of the inquiry. Though there are significant numbers of studies in the areas of unsafe situations on various industries in different parts of the globe, the researcher encounters a small number of qualitative researches within his limited quest. Among these qualitative studies, he finds a handful of qualitative studies extraordinary; these includes the study of Rowlinson and Jia (2015), Man, Chan and Wong (2017), Gomes, Arezes and Vasconcellos (2016), Zahoor, Chan, Gao and Utama (2017). However, Zahoor et al. (2017) mostly focuses on factors internal to organizations. Though Gomes et al. (2016) includes external factor like public policies, none of these two studies shed lights on how the factors influence to unsafe situations.

On the contrary, even though Rowlinson and Jia (2015), Man, Chan and Wong (2017) demonstrate "how" aspects, the first study confines to heat stress rather than overall unsafe situations at construction sites and social contexts. In terms of individual perceptions mentioned at the later one seems relatively different from that of Bangladesh if comparing with Dutta (2017). Similar observations are also found in studies on Bangladesh construction industries. The limited numbers of studies that this researcher manages to find on related areas, such as Rahman, Ezaz, Halder and Mondal (2015), Islam, Razwanul and Mahmud (2017) and Ahmed, Sobuz, Haque (2018c) are of quantitative design. Moreover,

these studies do not comprehensively address what and how perspective of factors contributing to unsafe situations in Bangladesh construction industry.

1.3.3 Practical evidence

As noted earlier, Walker (2015), Baicchi (2015) Carayon et al. (2015) and Dekkers (2017) observe industries as complex adaptive systems wherein not only the inner elements are interconnected, there exist interdependencies among elements within and beyond organizations which are nonlinear is nature. Taking this in consideration, Dekker (2015) criticizes the Cartesian–Newtonian languages of linear cause–effect relationships or metaphors and recommends complex and holistic view of relationships rather than individual components. However, Hudson and Hudson (2015) acknowledges that consideration of wider contexts in understanding and preventing accidents are still absent, in particular, Grant et al. (2018) indicates that worryingly heavy emphasis on end error event exists as foremost shortcoming in the widespread accident predicting approaches.

On the other hand, Røed-Larsen and Stoop (2017) acknowledges safety as a shared responsibility, thus overrides single actor or mono-disciplinary perspective of safety. In understanding safety, as the study notes, the dependency on advanced systems or technological innovation earns focus mostly. However, in practice, the dynamics of unknown uncertainties, that is, the interferences occurring from unknown interdependencies between components of the existing system remain overlooked, abandoned or uncharted.

This hinder-sight bias is also pointed in several other works like Dekker (2015), Bellamy (2018) and Pedersen (2018). Particularly, Dekker (2015, p.167) cautions that observing “the deficiencies in hinder sight is not an explanation of the generation or continued existence of those deficiencies” and this restricts prediction and prevention.

Agreeing on this, Pedersen (2018) categorizes incidents as heterogeneous and systematic by nature and acknowledges their numerous acceleration points of occurrence originated from interaction of system components.

Salmon (2016) indicates that, despite the fact that many methods exist and furthermore are proposed, in describing and rectifying wide ranging issues of wellbeing (human error, workload and situation awareness, accidents or system design) full capability is not yet engaged. Recent statistics from Workplace Safety and Health Institute (2017), HSE (2018) indicate that the prevention of fatalities are still dominant among all other industries regardless the economic level of country; however, HSE (2018a) believes that deploying additional workforce might lead to growing number of fatalities in construction industries in various part of European Union. On the other hand, Woolley, Goode, Read and Salmon (2018) advocates that existing perspectives to accident investigation or application of analysis might not suitably upkeep prevention initiatives. Identification of contributing factors of construction accident in the entire system is neither adequately addressed, nor there is clear explanation pointing how the factors are interrelated. Thus, the ability to control existing construction fatality significantly is disturbed.

1.3.4 Regional evidence

Construction industry, like many other nations, remains as one of the significant contributor to national economy for a developing nation like Bangladesh; Ahmed et al. (2018a) notes the industry provides employment 5.6% of national workforce (3.33 million) directly or indirectly in 2016 and contributes 7.88% of the Gross Domestic Product recently. However, Ahmed et al. (2018) refers construction industry as a rapidly and uncontrolledly growing industry that is significantly powered by unskilled worker. This

study also accepts that safety related issues are one of the vital elements that hinders progress and success in Bangladesh construction industries.

Hasan, Khanam, Zaman and Ibrahim (2017) concerns that the occupational safety situation in a developing country like Bangladesh is quite challenging, where attention to workplace safety monitoring from public or civil societal agency remains little; eventually workers are left with no option but accepting working unsafely. Moreover, Rahman et al. (2015) mentions that there is no government agency to monitor construction safety; particularly, Rahman (2018) acknowledges legislations on construction industry in Bangladesh does not outline safety management principles for construction industry, instead, provide guidelines to contractors and employees to carry out tasks in avoiding workplace hazards. The construction sector is still labor incentive and primitive; even though, some modern techniques and equipment are recently adopted by contractors, the overall safety at this sector is observed below satisfactory level. However, none of these three studies explain how these identified issues involve in contributing to unsafe work place.

Moreover, The Bangladesh Post (2018) views safety for construction workers in Bangladesh is generally ignored; ignorance and lack of awareness are pointed as reasons to most of the accidents. Particularly, blaming each other after any accidents has become a culture for construction firm owners and workers; and urges that this perception is to be changed towards understanding the real scenario to bring in a solution.

The Dhaka Tribune (2016) reports that in Bangladesh, construction industry is evolving with high casualty sector. Referring to the report of Bangladesh Institute of Labor Studies, Bdnews24 (2017) mentions that the casualty in construction sector counts as much as 1,196 during the period 2005-2016. Ahmed et al (2018) notes that there is no significant

change in cases of death in construction industries in Bangladesh in 2010-2015 span, as shown in Table 1.1. As OSHE (2018) reports, construction industry causes 179 cases of fatality, which is increased by 21.76 percent from 2016 and becomes the highest number of annual casualties since the accident recoding started about a decade ago. Among, various sectors of construction (building, civil engineering, engineering construction, refurbishment works and others in Norway), Winge and Albrechtsen (2018) finds 41.5 percent of all types of accident occurs in building type of projects followed by demolition at 19.9 percent. As of Table 1.1, in 2017 alone, for Bangladesh, Islam et al. (2017) notes hold Dhaka as the area with highest housing construction fatalities; housing construction sites alone in this capital city accounts 48.91 percent of the fatalities occurs in nation's housing industry in recent years.

Table 1.1: Casualty and injury cases of the industry (Islam, 2017; Ahmed et al., 2018)

Death and injury from accidents in Bangladesh construction industries (2010-2015)			**Death cases only in Housing construction industry in major cities (March 2008 to March 2010)**	
Year	Casualty (2016)	Injury	City	Number of death cases
2010	141	1355	Dhaka	90
2011	183	346	Chittagong	43
2012	149	433	Sylhet	51
2013	127	1365	Total	184
2014	130	432		

The concern for safety in Bangladesh construction industry is not a recent issue; early literatures like Bhuiyan and Haq (2008) notes that Bangladesh construction industry as one of the industries that requires widespread improvements in terms of safe work practice. After a decade, The Newage Bangladesh (2018) and The Financial Express, (2018) points, casualties in construction is heightening every year since 2008, this industry remains as a risky livelihood for thousands of workers. On the other hand, surprisingly,

Bangladesh readymade garments manufacturing, as noted by The Daily Star (2018) and The Financial Times (2018), in last five years, achieved dramatically groundbreaking progress in workplace safety and becomes as the safest workplace of its kind in the developing world.

For Bangladesh construction industries, as of Hasan et al. (2017), PPE (personal protective equipment) is believed to be main mean of potential risk regulation. Rahman et al. (2015) also indicates nonconformity of regulations, inexpert labor, and deficiency of PPE as elements disturbing safety in this construction industry. Hasan et al. (2017) extends financial restriction leads to low deployment and usage of PPE. Ahmed et al. (2018) also notes placement of significant unschooled and inexpert labor for the industry as well as limited quantity and application of PPE. In numerous literatures on other country context, such as Hollnagel (2014), Besnard and Hollnagel (2014) and Dekker and Pitzer (2016) indicate that limitations of reliability in procedural instruction against necessity. Literatures such as Dahlstorm and Snawder (2014), Sherratt (2016), Waterson and Dainty (2016) and Lyon and Hollcroft (2016) notes generation of false sense of security by PPE and hinder sight due to over attention at point of occurrence in understanding accident is indicated by literatures like Salmon et al. (2017). However, on Bangladesh construction industry context, accident causation studies like Rahman et al. (2015), Islam et al. (2017) and Ahmed, Sobuz and Haque (2018c) have their focus narrowed within compliance, skill and PPE mostly.

In summary, as noted within limitation of the researcher, the consideration of wide spectrum of factors involved are not taken in models, theory and empirical studies globally and locally. As, this narrow scope of observation does not depict the circumstances completely, there is still lack of understanding in identification of the factor and how the

factors are involved. Thus, the prevention of ongoing adversities experiences obstruction. For a country where the level of fatality in construction goes high every year, like Bangladesh, it is really essential for a through identification of contributing factors involved and enrich understanding their part in unsafe workplace, particularly in housing construction where the intensity of adversities is higher than other segments of construction industry.

1.4 Objectives of study

Thomas and Hodges (2010) and Kumar (2014) explain that the research objectives are the concrete statements that summarize what the research is trying to achieve. The research objectives are expressed in two ways: general objectives and specific objectives. General objectives are statement indicating the broad goals that are to be achieved; on the contrary, specific objectives are narrow in focus and systematically address various aspects of the problem.

1.4.1 General objective

In this study, as the key purpose, it is aimed to explore the factors contributing to unsafe situations at workplace as well as how they contribute for Bangladesh housing construction industry.

1.4.2 Specific objectives

To address the main objective of the study, the following specific objectives are adjusted for the housing construction industry in Bangladesh,

a. To explore what are the environmental factors that contributes to unsafe situations at workplace
b. To explore what are the organizational factors that contributes to unsafe situations

at workplace

c. To explore what are the individual factors that contributes to unsafe situations at workplace
d. To explore how the environmental, organizational and individual factors that contributes to unsafe situations at workplace

1.5 Research questions

This study structures two research questions to guide the research argument as well as to generate the necessary data to fulfill the objectives. The detail theoretical and empirical discussions that derive the development of these questions are at Chapter 2. Referring to the specific objectives 1-3 as mentioned in Section 1.3.2, this study outlines the first three research question for the housing construction industry in Bangladesh; on the other hand, the fourth question is outlined to support objective 4 mentioned in the same section.

a. What are the environmental factors that contribute to unsafe situations at workplace?
b. What are the organizational factors that contribute to unsafe situations at workplace?
c. What are the individual factors that contribute to unsafe situations at workplace?
d. How do the factors contribute to unsafe situations at workplace?

1.6 Theoretical framework

Collins and Stockton (2018) clarifies a theoretical framework as an application of theory in a study that concurrently expresses the inmost belief of the researcher as well guides how the study research processes to form new knowledge. Theoretical frameworks,

as Anfara and Mertz (2015) and Collins and Stockton (2018) elaborate, are the juncture of existing knowledge and previously formed impressions about complex phenomena, the researcher's epistemological stances, viewing lens and reasoned analytic approach. The influence of the theoretical framework spreads in methodological approach, determining boundary of the study as well as analytical viewpoint.

Though no theoretical framework or theory is self-sufficient to provide an impeccable explanation of phenomenon under study, Braun and Clarke (2013) and Anfara and Mertz (2015) suggest that a framework puts its impression largely in qualitative research processes as a mean of seeing and sense making of what is to be and what is done in addressing the research question. Therefore, as highlighted by Braun and Clarke (2013) Anfara and Mertz (2015) Collins and Stockton (2018), this study integrates a theoretical framework which is Open System Theory (OST) to facilitate direction in building understanding over the present knowledge, data required for answering research questions, forming the themes and codes in analysis process, organizing the research finding and lastly explain the findings.

Open System Theory (OST): Jackson (1991), Meyer and O'Brien-Pallas (2010), Miner (2011) and Cummings and Worley (2015) note Ludwig von Bertalanffy in establishing the notion of open system for organism in 1950; however, Katz and Kahn (1978) works for integrating Open System Theory (OST) for organization is noteworthy. Numerous literatures including Bess and Dee (2012), Fischer, (2010), Daniel (2010), Pavlovic (2015), Daft (2016) and Dekkers (2017) interpret open system by their interaction with the environment; for the open system, this exchange with the environment decides intensely the necessities obligated on the subsystems as well as their elements.

Moreover, open system involves constant internal tunings to stay in balance or harmony per environment.

Organization is an open system, as shown in Figure 1.1, Cummings and Worley (2015) explains that organizations are existent in the larger environmental setting and interconnected with environmental constituents. This model demonstrates that organization both receives inputs from the environment and transforms them through social and technical processes within. After the transformation, the output is delivered back to environment and might be fed back to organizational operations. This function of transformation within organization is potentially influenced by how organization faces the environment.

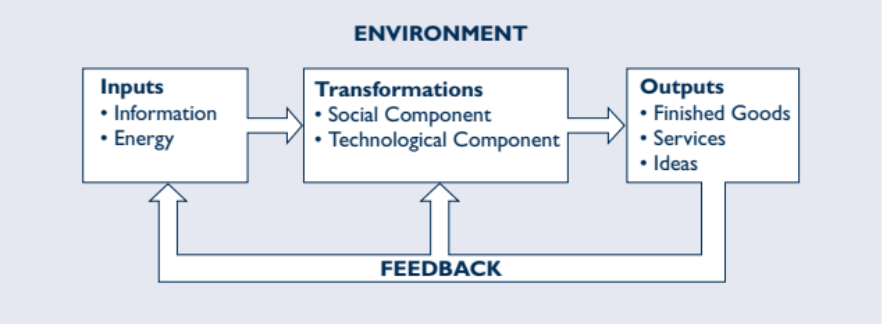


Figure 1.1: Organization as open system (Cummings & Worley, 2015, p. 90)

Rationale for selecting Open System Theory: Leveson (2011), Swuste, Gulijk, Zwaard and Oostendorp, (2014) Hofmann and Burke (2017) note that the Open System Theory observes system as a whole rather than separated or disintegrated. Besides, unsafe situations are emerged as consequences of inadequate control constraints on the interaction of system components, which can be well understood, if system taken as a whole as integration of both organizations' internal and external settings. Besides, as of Scott and Davis (2016), organizations are not only open to and depend on the environment for work

force, resources and information but also are shaped, maintained and infiltrated by its external environment; moreover, interactions with the external environment might be more critical than interactions among the components within the organization boundary. Moreover, organization is constituted of individuals; Kelly (2006), Bess and Dee (2012), Smither, Houston and McIntire (2016) and Shafritz et al.(2016) extend that individual behavior has the reflection of its culture, belief, values, expectations and understanding of norms and individuals take in their psychological necessities and tendencies to the workplace to perform their roles.

This study aims to understand organizational and environmental components in relation to individuals' action at workplace. Thus, the research question is related the organization system, the wholeness of the system and interconnectedness and possible sequences of action; thus, as of Sundström and Hollnagel (2006), the principles and understanding of open system is integrated in addressing research question. In adopting the Open System Theory as the research framework, this study understands organization, its environment and individuals as interconnected as this theory outlines. This study also acknowledges the components of environments and their influences in organizational function as stated by literatures on this theory. Moreover, the organizational structures are recognized in terms of subsystems as well. Therefore, in exploring what and why aspect of unsafe situations at workplace, during the in-depth and face-to-face interview session for data collection, the researcher's question towards the interviewees are based on open system constituents and their interconnectedness in contribution to unsafe situations. Besides, during analysis, the thematic analysis section, the predetermined themes are developed environmental and organizational constituents as defined in the Open System Theory; eventually, the findings that emerge as factors of unsafe situations are placed

under the respective themes according to their relevance with the theme. Lastly, the consistency of the findings is also discussed under the light of the Open System Theory.

1.7 Scope of the study

As an open system an organization is influenced by the environment it functions within. Besides, individuals take in their psychological necessities and tendencies into their workplace roles. Moreover, unsafe situations at workplace are emerged from the interactions of system components; therefore, this study conceives that, the individual, organizational and environmental factors contribute to unsafe situations at workplaces in Bangladesh housing construction industry. Even though there is likelihood of involvements of numerous elements, the scope of the current study is specifically limited to the availability of information from the selected informants, time and associated resources. The scopes are further defined in terms of definition of terms, population of study and sample of the study whenever applicable.

1.8 Significance of the study

Maillard (2013) and Marshall and Rossman (2016) explain the significance of the study as degree of contribution that the study leads in enhancement of understanding, to modify a concept or to endorse a unique hypothesis in a specific area of research. This contribution in understanding and opportunities of actions cover four domains: theoretical and methodological, strategy design, concern of practices and social aspects that affect daily life.

A study that aims to explore contributing factors to unsafe situations at workplace leads greater understanding on triggers for unsafe consequences. As safety in workplace is an ethical and moral obligation, the study potentially contributes in various areas:

expansion of understanding in factors (in general and contextual), methodology embraced, in formulating initiatives at individual, group, organizational and national level to heighten occupational safety practices.

1.8.1 Contribution to body of knowledge

The study is reasoned by the observed gaps in relevant body of knowledge. Therefore, the outcome of the study is likely to contribute in knowledge areas by providing additional understanding on factors contributing to unsafe work situations for construction industry; particularly, through further identification environmental, organizational and individual factors and describing how they contribute.

1.8.2 Contribution in methodology

This study is likely to contribute in methodology through widening understanding of contributing factors for unsafe work situation in Bangladesh construction industry context; particularly, by adopting fitting research approach, research philosophy, research design, and research instrument in exploring factors and involving non-numeric primary data to explore ‘what” and “how” perspective of the inquiry.

1.8.3 Contribution in safety practice

This study focuses on unsafe workplace as environmental, organizational, individual aspects; thus, for the practitioners. Thus, the study potentially contributes in understanding the factors of unsafe behavior in terms individual, group and organization and its outer environment in integration and modification of present practice to under the light of availed knowledge for safer workplace and adjustments of factors that that hurdles creating safe situation in workplace.

1.8.4 Contribution to stakeholder

This study potentially contributes to the stakeholders by limiting the likelihood of accidents facilitate development of a safe workplace where precious human life is unharmed as well as restrict losses of material and resources within industry.

1.9 Definition of terms

To provide a better understanding and assessment, the important terms are defined according to the research objective. The respective terms are defined as conceptually later functionally. Edmonds and Kennedy (2017, p.6) defines conceptual definition as the "scientific definition" for a systematic description, and the operational definition is the "actual" clarification of the phenomenon. The selected phenomena are defined both conceptually and operationally as follows,

1.9.1 Environmental factors

Almanae (2007, pg.10) defines environmental factors of an organization as "the surrounding factors in the organization affecting it" including "political and legal environment", "economic environment", "social environment", "technical and technological environment", and "ecological environment". As of WHO (2007, p.189), environmental factors are the aspects that "make up the physical, social and attitudinal environment in which people live and conduct their lives". In this study, as organization environmental factor, it refers all the factor that exist external to an organizational boundary, having direct and indirect influence on organizational function of gaining and transforming resources into value.

1.9.2 Organizational factors

Almanae (2007, pg.10) defines organizational factors as “all forms and types of information coming an individual, and which describe and clarify facts and characteristics of the organization positions, relationships and circumstances within the organization”. As of Shaikh (2010, p.2), organizational factors are “all the factors” internal to the organization that “impart strength or create weakness of a strategic nature”. In this study, organizational factors are outlined as all the factors related to an organization in terms of taking input from outside of its boundary as material, personnel, capital, information and undergo transformation process through human skills, abilities and equipment and generate output that allow it to acquire inputs.

1.9.3 Individual factors

Health and Safety Executives (2010) outlines individual factors as features of physical, mental, personality, knowledge and experience within an individual. By individual factors, this study indicates physical, psychological, knowledge and experience aspects within an individual involved in the industry (as defined in section) in shaping perspective, priority and action while at work.

1.9.4 Unsafe Situations

As of, Government of New Zealand (2019, pg.9) unsafe situation is defined as existence of “significant risk that a person may suffer serious harm, or that property may suffer significant damage, as a result of dangers arising, directly or indirectly”. Manuele (2013, p. 30) understands unsafe situation as the “probability of an undesired incident occurring, and the severity of its outcome are” are unacceptable societally. For this study unsafe situations are referred as the unintended events that hold potential susceptibility to result injury to personnel or damage to the items exposed.

1.9.5 Workplace

National Joint Council (2003) understands workplace as the location at or from which an employee ordinarily performs the duties of his or her position. For this study workplace is the location where the activities belonging housing construction industry (as defined in Section 1.8.6) in creating value through transformation.

1.9.6 Housing construction industry

NASA (1996) understands housing construction industry as general contractors and operative builders primarily engaged in the construction of residential buildings. For this study, housing construction industry infers to be the branches of construction industry that is involved into activities of constructing, modifying, demolishing, and repairing of residential building.

1.10 Chapter summary

This chapter presents a brief discussion on present understanding and practices of identifying factors of unsafe situations for construction industries. This chapter highlights present knowledge gaps and rationale for the necessity of further study in exploring these factors. In the next chapter concepts, theories, models and current knowledge related to identification of factors are discussed.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

This chapter delivers present literature that concerns elements contributing to unsafe working situations in the construction industry in relevance to the study. The chapter covers the present understanding of the unsafe situation in terms of interconnected agents, various models portraying what makes a workplace unsafe as well as a research framework for this study. This chapter also includes a theoretical lens that is selected for explaining the findings. In particular, this chapter provides relatable conceptual and empirical evidence for framing and addressing the research objectives.

2.2 Being safe or unsafe at the workplace: a literature review

Creswell and Creswell (2018) understands literature review in four discrete forms: integration of knowledge that other researchers avail and discuss, indication of elements at disapproval in researches and scholarly works already conducted, connecting the relevant factors in relation with issues under consideration (problem statement of the current research) and pinpoint the principal concerns in the area under interest. The literature review organizes the availed knowledge in sequential manners and in terms of interconnected phenomena, mostly from broader capacity to the narrower area.

Krepon (2009), Molineux (2010), Camilius, (2011), Brownsword and Goodwin (2012), MCKinnon (2014) and Friend and Kohn (2018) explain that occupation is an engagement with activities that is mostly for survival, however, almost any activity inherits some extent of probability and severity of a loss event taking place. Like all organisms including humans bear the instinct to survive and seek protection from being harmed, this

concern for self-preservation is as old as human civilization and will continue as long as the human race exists. Even the history of safety in occupation is neither recent; historical records are as deep-rooted as 2100 BC; a decree from the Babylonian ruler Hammurabi focuses the importance of protection of humans in trades like shipping and construction.

Brownsword and Goodwin (2012, p. 111), Friend and Kohn (2018) and Heffernan, Harries and Kirby (2018) explain that when individuals are exposed to harms at the workplace, it also affects broader economy greatly in terms of insurance claims, compensation, absence, downtime, re-staffing and re-training and so on. Nevertheless, complete elimination of losses is impractical; thus, the notion of preserving and protecting humans and resources at the workplace is to restrict the likelihood of being harmed at an "acceptable level, that is, as low as reasonably achievable.

Gonçalves, Sobral, and Ferreira (2017) and Reese (2017) acknowledge that the concern for safety; as the destruction of human life is not justified, the workplace accidents are to be prevented. However, Duffey and Saull (2008, p.98) notes "approximately 80% of accidents are caused by human error" directly or indirectly. Similarly, as of Reese (2012) and Reese (2017, p. 17), "all accidents are preventable" and the cause-effect relationships can clearly identify and picture the fundamental causality of accidents, particularly, human error is the root cause rather than purely equipment failure.

In terms of human error, Sherratt (2016), Woods et al. (2017), Wiegmann and Shappell, (2017), Simpson and Horberry (2018) state that, accidents as a complex dynamic rather than too simplistic to be a single factor or single human entity. However, the understanding and practice of being safe are contradicted, misled and myth directed; Reese (2017, p.5) and McKinnon (2019, p. 14) acknowledge the existence of cost factor dominantly tied in the interpretation of a number of accidents. Therefore, despite the age-

old concern for being safe at workplace and advancement of human civilization, individuals are still susceptible to harms at the workplace; in 2014, in the USA alone, there is 3.8 million reported cases of work-related injuries and diseases and 18000 fatality cases which is equivalent to 13 in a day. Besides, there are 60 million days of work loss that counts overall USD198.2 billion worth of collective loss. “Safety is first’ is one of the dominant viewpoints that convey “wrong message” and cannot be said ‘truthfully’ or ‘honestly’; “getting the job done is first” as it involves the return of investment.

Friend and Kohn (2018, p. 10) explain, “the benefits of further lowering the risk must be greater than the cost”. Eventually, to compare between the cost associated with injury or fatality prevention with the expected benefits, society entitles human life a price; McKinnon (2019) expresses worriedly that as of The National Safety Council, the cost of a lost life stands USD780,000 in 1993, USD980,000 for 1998 and USD1,542,000 for 2015. This harsh reality of safety is that the freedom from injury and harm is not a priority. Moreover, there is a necessity for the rethinking of safety wherein safety is treated as an ethical value that remains constant rather than a priority that can get fluctuated.

2.3 Human error in causing accidents

With reference to the work of Greenwood and Woods (1919), the attention for seeking causation in accidents has a history of a century; after another half-century, this quest leads to an inference of human error by Heinrich (1931). Indicating Heinrich’s idea, Wallace and Ross, (2006, p. 22-23) explain; though mechanical and physical hazards contribute to accidents, they are always headed by “ancestry and social environment causing the fault of the person”. Thus, individuals are the “root causes” of the accidents. Moreover, Heinrich sticks firmly to the Newtonian perspective of the reality of happening, in terms of orders of events. In investigating the causes behind the accident, as Cacciabue

(2004) and Friend and Kohn (2018, p. 248), the root cause is most likely a human error that stands behind “as many as 85 to 95 percent of all accidents”. Reason (1990, p. 9) understands human errors as a generic phenomenon to cover all the circumstances where “a planned sequence of mental or physical activities fails to achieve its intended outcome” as well as when these fail “cannot be attributed to the intervention of some chance agency”.

Regardless the accidents in various industries, there are general three aspects; they are hazards, failed defenses and losses; Ternov (2011), Shane (2013) and Reason (2016) extend that, every defense has its own weaknesses and the reasons that lead to a failure in this defense can be broad of latent conditions and active failure. Active failures are unsafe acts of the entity with direct contact with the system, on the other hand, latent conditions are not necessarily a cause itself but its catalytic existence is necessary for the cause to have an effect. Eventually, damages occur when these inherent weaknesses align and create an opportunity for hazards to get in contact with individual or assets.

In particular, as of Pollock (2004), Esgate, Groome, Baker, Maguire and Reed (2005) Reason (2016, p.14), active failure is referred as “unsafe acts” generated from errors (rule-based and knowledge-based) or violations (routine violations, thrill-seeking or optimizing violations, necessary violations and exceptional violations). In particular, two distinct situations, where modifications are required, that is, the psychological condition of distraction and task or contextual change contribute to errors. Besides, Reason (2016) and Dhillon (2018) conceive that slips are predictive and human errors are subjected to probability and quantification.

On the contrary, though human errors are seen as primary contributors in significant cases, Manuele (2011, p. 240) understands that errors are “natural consequence

of a mismatch between human capabilities and demands". Moreover, Manuele (2011) and Besnard and Hollnagel (2014) criticize Heinrich's perspective for promoting that error generates from the human belonging to the worker level only; thus, the attention of causes is narrowed towards operators' action. These pieces of literature also point that contexts are not only preconditions for errors, but they themselves can also be causes. Dekker (2014) mentions, despite recent understandings of human error, incorporates organizational contribution to failure to see the human as an effect than a cause, the idea of unsafe acts leads to get something wrong done at the point of occurrence for breaching the protective levels. Thus, the human becomes a final and necessary cause, though with a weak link.

2.4 The root cause of an accident

The cause analysis, as Forck and Noakes-Fry (2016) explain, is the process of exploring thoughts on mental models, beliefs and that first influences then reproduces the noticeable behaviors or actions; the responsible drivers or reasons are called root causes. The intention of structured investigation for root causes is to identify causes, later prevent recurrence of future accidents. However, Mannan (2012, p.2146) mentions that the aim of the root cause might vary depending on the organization or observer himself. The investigation can be aimed at either at the first or last cause of the chain of events leading to the accident. Root causes are 'abstracts' and often "buried beneath many layers of failures" while direct causes are more 'tangible' and 'superficial'. If the direct cause is rectified, but the root cause not, the problem persists. Reese (2017) mentions that the goal of a root cause is to understand a complete event that conditions accident and present chronological causal factors as a chain.

However, Relyea (2013) concerns that, accident investigations are mostly shallow and inadequate root cause analysis rarely points to the actual causes for future prevention.

On the other hand, Hollnagel (2014) holds that despite root cause analysis aims for a conclusive solution to the problem, it starts with partiality and ends up with pointing human error as a root cause mostly. Moreover, the concept of root cause in the accident is delusive. Because events in a workplace (which is a sociotechnical system) is not unaffected by the influence of practical issue, personal bias or political influences, the interpretation of events are more to psychological rather than a logic-driven.

Whittingham (2004, p.257) and Wiegmann and Shappell, (2017) accept that it is unusual that "accident causation can be simplified to a single direct cause and root cause". Tweedy (2014) understands that accidents occur in a complex interaction of multiple agents; thus Dekker (2015) and Woods et al. (2017) criticize Cartesian–Newtonian cause-effect interpretation of accidents and suggest holistic views of happening rather than simplistic and single point focused. In particular, Besnard and Hollnagel (2014, p.22) holds, investigating cases is a "social process, where causes are constructed rather than found". Moreover, Smith (2014), Dekker (2015) and Woods et al. (2017) understand that accidents are symptoms of system defect where unsafe acts from individuals come under trigger factors rather than being a root cause. In addition, Reese (2012) extends that the unconnected work process, work context or management structure is complex enough by itself. Complexities arise when they all are incorporated together in an organization. Additionally, social contexts from the government to union to peer, all interact dynamically to this complexity; therefore, this extended interaction and interception require to be attended for successful prevention of accidents.

2.5 Safety compliance and unsafe situation

McKinnon (2014) mentions a lack of control, is one of the undesirable events connected to the likelihood of accidents. In particular, Reason (2016) points, the absence of

safety standards or flawed standards and noncompliance to safety standards remain as the dominant possibilities behind the major accident. McKinnon (2014) and Friend and Kohn (2018) extend, for actions and conduct, these standards are set, made accountable, measured for deviance to assess conformity and corrected in reducing potential causes of loss, thus, preserving safety at the workplace. Besides, Dhillon (2018, p. 131) mentions of Chernobyl accident and emphasizes the need for "strict compliance" with safety requirements in operation, design, and construction.

Idea of effective compliance leads to performance comes from Taylor's view of scientific management, where human is nothing better than a complex machine and this idea becomes the foundation of safety compliance; Hollnagel (2014), Besnard and Hollnagel (2014) and Dekker and Pitzer (2016) explains that chronological form of the procedural instruction does not always match with the reality or necessity. Moreover, procedures demand skillful cognitive interpretation for ensuring its own suitable application. Therefore, without the user's judgment, the procedure is unable to dictate its own application in a complex, dynamic situation. Therefore, strict and rigid compliance dependency is likely to lead to unfavorable situations.

Besides, even earlier pieces of literature like Roberts (2000) and Knowles (2002) to recent literature as Dahlstorm and Snawder (2014), Lyon and Hollcroft (2016) and Sherratt (2016), all indicate the misunderstanding, misinterpretation, and misconception of safety practices. Referring to personal protective equipment (PPE), Sherratt (2016, p.66) explains that PPE has a dominant presence in industries in such a way that a hard hat socially constructs a construction worker. However, ultimately, this directs to "substitution of PPE for safety itself". Roberts (2000), Lyon and Hollcroft, 2016) and Sherratt (2016) hold that the position of PPE at the bottom of risk reduction strategy; particularly, Knowles (2002, p.

223) and Dahlstorm and Snawder (2014, p.690) perceive that PPE generates “false sense of security” among individuals. Moreover, as of Harvey, Waterson, and Dainty (2016), imposing and implementing of no-hard-hat-no-work is most likely to cause pessimism and hindrance in situations a hard hat is not necessary. Reason (2016) acknowledges that every safety case is unique and that is aimed and formed for a particular purpose of happening in a wide spectrum of hazard domain. This wide spectrum of domains is also applicable in predicting for etiology of occupational incidents. However, from the regulators’ perspective, mostly, technical issues from technical domains are mostly covered, however, the human or organizational domains are less likely. Therefore, Roberts (2000, 179) points out that, despite individuals’ behaviors or compliance to safety regulations are quite dissimilar; they both need a tie together for the best reduction of unsafe situations. Moreover, “when focusing on a worker’s potential for getting hurt instead of the rules, it is easier to convey genuine concern for a person’s welfare”.

2.6 Incidents, near-miss, accidents, and unsafe situations

Earlier pieces of literature like Vincoli (1994, p.7) understands accidents as “unplanned therefore undesired’ events that cause bodily harm and or damage in the property. Similarly, recent pieces of literature like Friend and Kohn (2018, p.85) defines an accident as “a loss-producing, unintended event”. However, Kenett and Raanan (2011) extends and explains accidents to undesired circumstances that result in injury and illness to humans and damages to property, facility, environment and leads to a loss in production and raise liabilities.

On the other hand, Vincoli (1994) mentions that unplanned events that could have been but is not observed to result in damage or injury are still considered as undesired as they interrupt the normal flow of work and term them as incidents or near-miss. Friend and

Kohn (2018, p.85) identifies incidents as “unintended event possibly not causing a loss” and includes near-miss events to incidents due to their absence of consequences in terms of harm or losses.

However, Dodson (2016, p.309) mentions that the idea of miss events or close call events are subjective. Though incidents or near-miss events inherit the potential of injury, casualties or damages, only a “fortunate break in the chain” isolates a near-miss event turn into accidents. The non-prejudiced and non-judgmental attitude to view these events becomes an important means of veracious learning on warnings, situations, contributing factors without paying much price for any losses. Though Reese (2012) views accidents are the subsets of incidents; both Reese (2017) and Fiorentini and Marmo (2019) acknowledge accidents and incidents as interchangeable as long as the potential susceptibility of safety is concerned rather than volume of damages caused. Thus, deducing from these, both accidents and incidents fall under unsafe situations.

2.7 Causation in complexity

As of Coffman (2011), scientific inquest is driven by the intention to know the causal foundation of empirical reality in order to gain further predictability of events in the natural world. In life science, causation is facilitated by reductionism; that is, the focus of causality is reduced to molecular or cellular arrangements that are isolated and controlled in experimentation at a laboratory. Macroscopic events (disorders like diseases) are believed to be originated at microscopic processes wherein the consistency of predictability is established by unchallengeable and mathematically interpretable laws of natural sciences. There, the causal agency is anticipated to control macroscopic processes from the bottom to up. However, as causality is believed to be reducible into a linear chain of events, this single pathway presentation of causal processes does not consider the

complexity even in higher-level processes. However, this oversimplification in reductionism is unlikely to acknowledge limitations in a given approach.

On the other hand, Gilpin and Murphy (2008) notes, complex system embraces numerous entities that exhibit the great extent of nonlinear interactivity. Due to the uncountable nonlinear interactions among combined networks makes the system almost impossible to predict and control through linear chains of cause and effect relationship. Moreover, unlike linear systems, a complex system cannot be reversed precisely back in time to account for the effects.

2.8 Accident Causation theories

Hudson (2014) mentions that accidents can be prevented in an effective manner if remedial actions are taken on the identified underlying causes. The theoretical understanding of causes of accidents enables to analyze nature of the causes as well as how the causes act in the process of an accident occurrence. Logical steps of predicting the adversity before occurrence are explored quite extensively for several decades in terms of theories and models; however, Grant, Salmon, Stevens, Goode, and Read (2018) notes that concentrating on end error event, questionable suitability and intensive applications of numeric model and formulations exist as the major limitations in typical accident predicting methods. The following segments describe some of the widespread accident models in relation to accident causations in relevance to this study.

Domino theory: Among the accident causation theories, Heinrich's Domino Model that is published in 1931 is believed to be the first of its kind. Pieces of literature like Leveson (2011), Dekker (2015), Griffin, Young and Stanton (2015), Mustapha, Aigbavboa and Twala (2018) and Fiorentini and Marmo (2019) explain that this theory. This theory understands an accident as five blocks of domino in a row falling as a chain of events as

exhibited in Figure 2.1. Here, the failure as the linear and proportional effect of other lapses in adjacent dominos, thus, causes are simply located tracking backward in time and location. Among the five dominos of social environment and heredity, fault of the person, unsafe act or unsafe condition, accident and injury, Heinrich acknowledges the third domino of the unsafe act or unsafe condition, as most vital and the easiest to eliminate in preventing accidents.

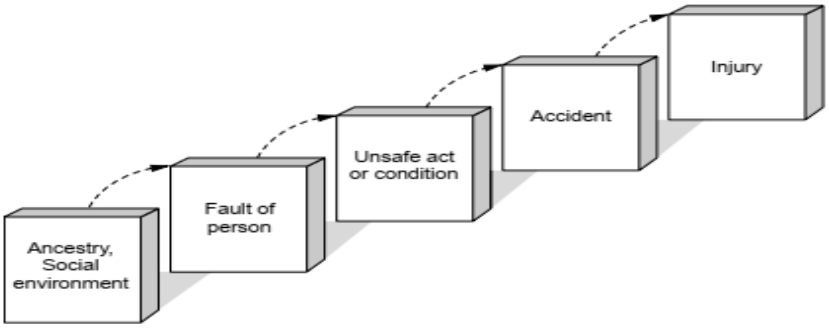


Figure 2.1: Heinrich's Domino theory of accident causation (Leveson, 2011, pg.16)

However, Wallace and Ross (2006, p.26) understands that the aspect of the root cause is "profoundly perspectival", thus, though "surprising popular' idea of single root cause in domino theory is "unusually crude" and "nothing obvious or commonsensical". Leveson (2011, p.17) also notes this issue of single root cause and extends that in identifying causes of accidents this theory "lives on in the emphasis on a human error"; and 'inadequate' for a complex system. Beside the Henrich's theory, Friend and Kohn (2018, p.95) several identifies other Domino theory stated by Bird and Loftus (in 1976 with 5 dominos representing different clusters than Heinrich's) and by Marcum (in 1987 with 7 dominos), however, mention them as "too simplistic".

Accidents emerge as the combination of the outcome from the constituent components, which are on the interface in a larger system in numerous ways. Human error is not just an unmethodical occurrence evolving from blank; it is an indication of excessive system defect. However, positioning ancestry as the block in domino for accident causation, this model tends to establish individuals from a particular band of heredity as the cause of accidents. Apart from these, this theory does not shed much light on organizational aspects like supervision or group dynamics.

Thus, Domino theory has its attention mostly to humans, in particular, a specific class of people as to cause of accidents. Though the social environment of an individual is taken into consideration, the social-economic, legal, business environment of the organization in influencing organizational function is absent here. Apart from these, this theory does not shed much light on organizational aspects like supervision or group dynamics. Besides, in complex adaptive systems, the interactions among system components are multiple and nonlinear interactions. However, Domino theory holds a simplistic linear view on accident causation and makes small things unable to lead to causes for larger consequences. Besides, this chain does not shed light on cases where there are simultaneous actions along with the links.

Swiss cheese model: In describing the Swiss cheese model of accident causation, Leveson (2011) states, domino theory is “reinvented’ after two decades from the original where Swiss cheese slices replace the dominos and slices represent as a layer of defense. Reason (1990) and Reason (2016) explain that the cheese holes denote two classes of failures: active failure and latent condition/failure; as noted before, active failures are errors or violation at point of occurrence, whereas, the presence of latent conditions is necessary for a cause to take effect.

On the other hand, Underwood and Waterson (2014) and McLeod (2017) explain that long sustained organizational scarcities are likely to develop the necessary condition for an active failure at the front end and trigger an accident. The existence of accident shaping conditions is in the inadequacies of defensive layers that are designed to obstruct accidents. These inadequacies are presented as holes in the Swiss cheese model. Eventually, accidents occur when the holes in the defensive layers align as exhibited in Figure 2.2.

However, in reviewing Swiss cheese model, Leveson (2011) mentions, the elements of a domino model (inadequacy in application for complex system, notion of single root cause and attention narrowed toward human error) regrettably continues in Swiss cheese model; moreover. Besides, the model does not comprise of the important aspects that are required to understand why accidents arise and how to avert their recurrences. In this model, Wallace and Ross (2006, p.26) and Underwood and Waterson (2014) point of 'deterministic' relationship and term them 'unscientific'. Though the Swiss cheese model incorporates elements of system theory, Grant et al. (2018) explains, it embraces reductionism and ignores both dynamic and holistic presentation of a system. Like the Domino theory, this Swiss Cheese Model has the limitation in depicting an accident. In a larger system, the system components are in interactions numerous ways and the interaction is complex and dynamic; however, this model depicts accident causation in the alignment of organizational influence, unsafe supervision, precondition of unsafe acts and unsafe acts; thus, the focus of this model is aimed at human reliability or unsafe acts. This theory also holds an organization as functioning as an individual as well

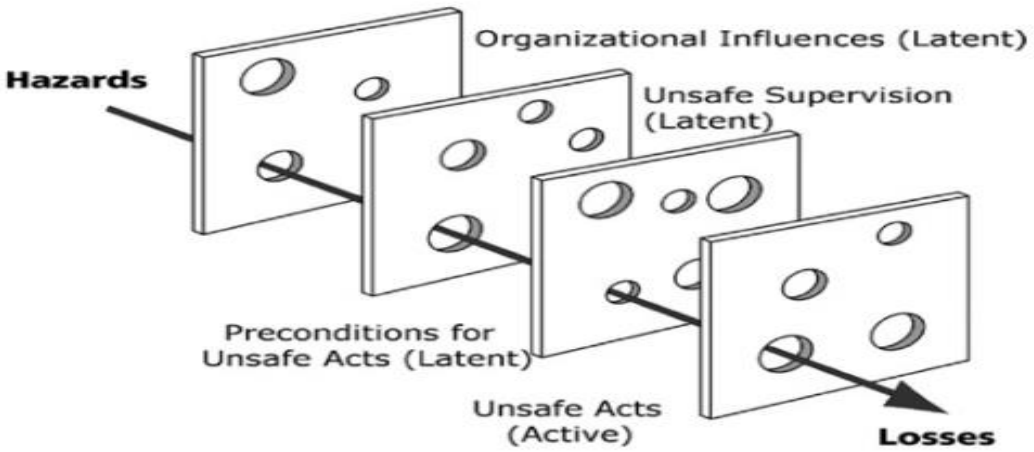


Figure 2.2: Reason's Swiss cheese model (Griffin, Young & Stanton, 2015, p. 34)

as a standalone entity, it does not acknowledge that organization functions in an environment and its function is influenced by the same environment wherein it functions. Thus, a comprehensive presentation of agents in interlinking actions in surfacing unsafe situations is absent in this theory. Though supervision is included as a layer, there is no inclusion of group dynamics at task execution. These limit this theory to depict an accident holistically and thus, restrict the comprehensive understanding of accidents.

Model of the sociotechnical system for workplace safety: Broadly Carayon et al. (2015) points that current causation initiatives preserve overemphasis on human failure and have an inadequate focus on individuals' contact to hazards. Sole attention to these localized failures rather than within interconnectedness of the whole system reasons the safety issues to persist in present days and concernedly with high magnitude. Taking multiple interdependent elements of the work system and the environment as well as the complex and dynamic nature of the system, Carayon et al. (2015) propose a sociotechnical system model of workplace safety.

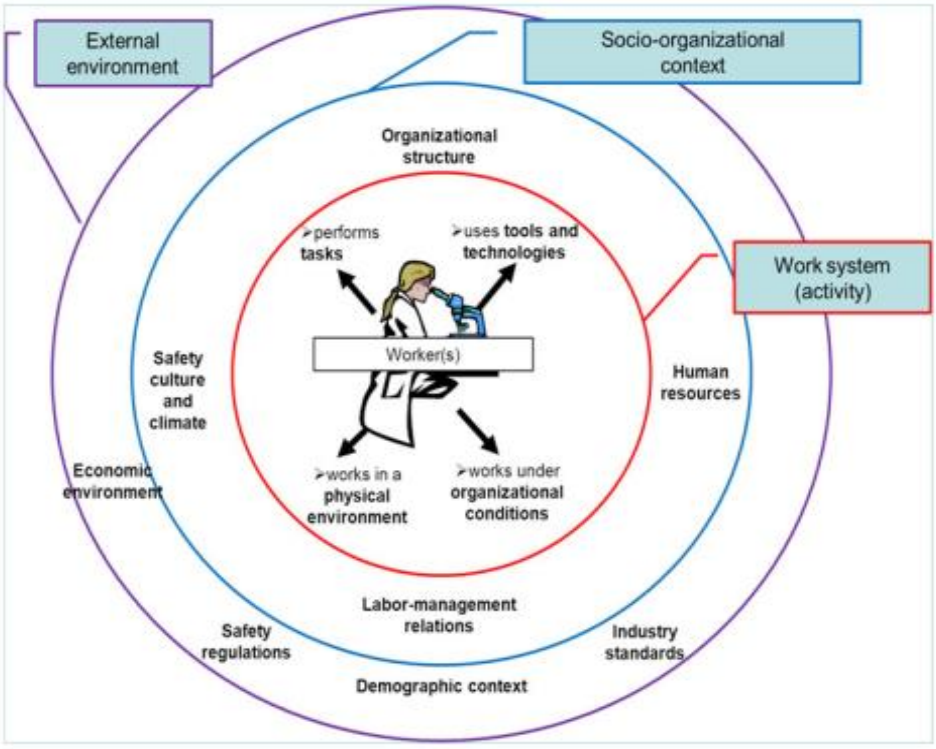


Figure 2.3: Socio-technical system workplace safety model (Carayon et al., 2015, p. 558)

The sociotechnical model of safety by Carayon et al. (2015) features non-deterministic, limited functional decomposability as well as emergence and self-organization. The model integrates various elements in work activities where a greater socio-organizational context encircles the work system; in concentric layers, and work as 'point of occurrence and its relationship to the remaining of the organization as well as the external environment. As exhibited in Figure 2.3, the core layer is termed as a working system that explains the human-centric contexts where tasks take place. The second layer or social-organizational context indicates the existing social and organizational structure and practices that moderates the efficiency of the work system. Moreover, the outer layer that includes a social, economic, legal and political setting that influence the organizational structure and its interaction with the environment.

Despite this model indicates that each system element is in interaction with others and the system elements are taken from a broader perspective to depict the wider interconnectedness, the model does not elaborate what are the factors of the individual, internal and external environment contribute to an unsafe situation and how they develop to enhance the understanding of safety. Besides, due to the positions of concentric sequential layers of environment, organization and individuals in the model, it does not present environments' direct influence on individuals.

2.9 Open system in explaining unsafe situations

In contrast to the narrow reductionism of classical science, Hammond (2010) acknowledges that the problems in the society are systematic in nature and they are emerged from the perception crises that are embedded in mechanistic model of thinking. Therefore, the greatest obstacle to socio-political development has resulted from the mechanistic understanding of reality and rationality that obstructs bearing of a more ecological or systematic perception of this "fundamental interconnectedness and interdependence". The Cartesian separation of matter and mind only depict a fraction of reality; thus, a humanistic approach is urged to address human concerns with more comprehensive reality than dehumanized linear causality and reductionism inherited in the mechanistic perspective of natural science. Even though there exist correspondences between organic and inorganic systems, Pine (2007), Turku (2009) and Hammond (2010) hold that, the analogy of biological structures is only comprehensible when taken as a whole in its social and ecological contexts rather than in isolations.

To restrict the reoccurrence of an accident, literatures like Dekker (2011), Roughton and Crutchfield (2014), Dekker (2015), Kleiner et al. (2015), Woods et al. (2017) and Grant et al. (2018a) point that the attention and efforts engaged to understand

and predict how constituents or work processes act together as integrated in the larger system in case of an unsafe situation. Besides, Salmon et al. (2017) and Harvey et al (2019) acknowledge that system thinking observes unsafe situations as emergent from dynamic interaction within people, equipment and strategies at different tiers of the work process, not from a root cause or by people at the point of occurrence.

Moreover, Ternov (2011a), Murphy, Robertson and Carayon (2014), Carayon et al. (2015), Niskanen et al. (2016), and Grant et al. (2018a) recognize work system as a combination of social and personal aspects as well as their joint optimization in organizational design and physical environment through interconnections at macro, meso and micro level. Additionally, unsafe situations are yielded from a unique combination of interactions of individual, organization and environmental constituents. Leveson (2011), Swuste, Gulijk, Zwaard and Oostendorp (2014) and Hofmann and Burke (2017) acknowledge that the unsafe situations as emerged in interaction of system components. Moreover, the occupational safety studies, in its hundred years of oldness, shift its focus from individual factors to organizational factors and later environmental impulses in human safety in occupation to have comprehensive understanding and prevention of accidents' reoccurrences.

Morley and Harris (2006), Meyer and O'Brien-Pallas (2010), Carayon, Hancock, Leveson, Noy, Sznelwar and Hootegem (2015) and Thomassen, Heggen and Strand (2017) observe organizations as open systems that interact within the environments to acquire raw materials, people and energies and transform into functional outcome, organizational outcome and human resources outcome which includes health, safety and professional advancement. However, regardless formal or informal by structures, Long (2013) and Scott and Davis (2016) describe these organizations are not only attached and dependent on the

flow of personnel, resources, and information from the external environment but also shaped, supported, and infiltrated by the environments wherein they carry out their functions.

Sahni and Vayunandan (2012), Bess and Dee (2012), Smither, Houston and McIntire (2016) and Dekkers (2017) mention of subsystems with the open system organizations wherein every subsystem has not only its own input-conversion-output processes but also interactions among subsystems. These complicated interrelationships of elements of an open system develop numerous links of interdependencies as well as generate non-linearity in behavior. Moreover, as people take in their psychological necessities and tendencies to the workplace, there also exist psychological and social aspects of individual and group behaviors as perception, group dynamics or interpersonal relationship in association with the task, which is also explained by a subsystem of an open system.

Thus, the open system both acknowledges and elaborates on the existence of organizational function in terms of the interconnection of organizational environment components, individuals and tasks. Therefore, in exploring the factors contributing to the unsafe situation at a workplace, as noted before, this study holds the open system as guidance; wherein the exploration of factors is conducted under the predefined themes of organizational environmental constituents, organizational sub-systems and individuals as outlined by open the Open System Theory.

2.10 Construction industry from the system perspective

Jones (2013) explains of organizations as a platform that individuals use to accumulate and harmonize their efforts in obtaining what they desire or value. In order to create value, organizations take input in terms of material, personnel, capital, information

and undergo transformation process through human skills, abilities and equipment and generate output as goods, services, dividends, salaries and values to the stakeholders that allow organizations to acquire inputs. In both input taking and output releasing, organizations interact with its environment which can be defined as sets of forces or conditions outside of an organizational boundary affecting organizations' capability in gaining and transforming resources into value.

On the other hand, Hill (2011) and Tester et al. (2012) note that an open system interacts with their environment to draw resources that they disperse back after transformation and restock again to sustain the system. On the other hand, Baicchi (2015) and Mishra (2017) understand that organizations are broad as open systems; in particular, a higher-order complex adaptive system; that is, not only open, complex and nonlinear but also embodied within a larger system in integration of systems at its own level, higher level, and lower level. The residents of a higher complex adaptive system like industry are widespread with interacting similar organizations, suppliers, customers, and complimentors. The adaptability of this system explains the dynamic capability of the organizations of the industry in terms of an alteration of their resources and structure of transformation in responding to the alteration of environment where the adaptability and complexity come with the multiplicity in value activities. Geels (2005), Hooker (2011), Dammann and Smart (2019) explains complexity as interlocking or processes and activities and no reductionist and holistic in terms of causation.

In particular, Tah (2009) and Walker (2015) point to the construction industry as a complex adaptive system. Walker (2015) explains that like other business organizations, the construction industry functions as an open system; the customers exist in the environment of the industry operation, the industry takes in ideas, material, information,

and a workforce to complete the construction project. Moreover, present-day economic, social and environmental issues influence clients to demand complex, cultured yet economical projects what the industry requires to adjust eventually, thus, add complexity to the work process as well as pressure for cost-effective application of resources in the industry.

2.11 Construction industry and Bangladesh

Numerous pieces of literature including recent examples like Seo et al. (2015), Senouci et al. (2015), Hallowell and Yugar-Arias (2016), Wang et al. (2016) and Harvey et al. (2018) generally differentiate construction industry as project-based, dynamic, complex yet short-termed, temporary workforce powered, and highly labor-intensive pattern or tasks done in decentralized locations. Moreover, Mustapha et al. (2018) acknowledges that the complexity of the construction industry is compounded with extensive use of equipment, change in topography, subcontractor dependency, as well as diversified workforces in terms of trade and skills.

Regardless the condition of the economy, Awwad et al. (2016) and Williams, Hamid and Misnan (2017) mention, the construction industry has a major and active role in economy for every country in the world and Ahmed et al. (2018c) notes 6% global GDP is earned by this industry. However, Ahmed, Shaukat, Usman, Nawaz and Nazir (2018b) points, occupational accidents and injuries account 4% of the world's GDP and the construction industry is one of the industries with the highest rate. Though the picture of Bangladesh construction industry is similar in terms of economy, industry attributes, types and magnitudes of accidents in comparison to few developed and emerging countries of the world, the industry also shows dissimilarities such as workforce characteristics.

Contribution to Economy: For Lebanon, Awwad et al. (2016) mention the

construction industry contributes 4% of national GDP by employing 9% of the total labor force in recent years. Particularly in Malaysia, Khan, Liew and Ghazali (2014) and Khan, Ghazali and Isha (2014) note that, for last two decades, the construction sector does not only support the nation with average 4.09 % share of Malaysian GDP, but also the industry grows with the rate of 4.74% with absorbing 8.56 % of workforce into employment.

In addition, Kamalnataraj and Ramasamy (2015) and Chakraborty, Das, Pathak, and Mukhopadhyay (2018) mention of the Indian construction industry as one of the leading in the globe in terms of investment, which is USD 620 billion for the year 2015. Immediately after the agriculture sectors, construction firms contribute most in the country's economy with a share of 11% in the GDP and 32 million workforces. Besides, in Pakistan, Ahmed, Shaukat, Usman, Nawaz and Nazir (2018b) mention that 30–50% of the nation's GDP of USD 232 billion is covered by the informal sectors, and 12.30% of this informal sectors are powered by construction industry alone. Zahoor et al. (2017) adds that 7.3% of the total labor force in Pakistan is employed by the construction industry.

On the other hand, Ahmed et al. (2018a) notes that construction industry, like many other nations, remains as one of the significant contributors to national economies for a developing nation like Bangladesh; providing employment 5.6% of national workforce (3.33 million) directly or indirectly in 2016 as well as contributing 7.88% of the Gross Domestic Product recently.

Type of the accidents: Referring accident statistics of Safe Work Australia, SWA (2015) reports as the main causes of the death are falling from height involving ladders, ramps, and stairways, colliding with vehicles, electrocution, impact moving objects, falling objects, or trapped between equipment. WSH-Institute (2016) analyses the reported Singaporean construction accidents for 2015, and point the main reasons of injuries as falls

from heights, slips, trips and falls, struck by moving objects, being caught in or between objects, struck by falling objects from heights, collapse or failure of structure and equipment and crane-related incidents. Furthermore, in Malaysia, as of Chong and Low (2014), the impact from the motion of equipment or objects is regarded as the main type of accidents in construction industries, which is followed by falls from height. Additionally, this study chronologically mentions non-categorized reasons (for example, structure breakdown, electrocution, burn and asphyxiating, blast, drowning and toxic pollution), source of being caught between objects and overexertion as a significant type of accidents in construction accidents in Malaysia. Lastly, considering 183 fatal cases of construction accidents that happened during 2008-2010 in 4 metropolitan cities in Bangladesh, Islam, Razwanul and Mahmud (2017) points out that about 70% of the fatalities happening in any city is claimed by fall from the height. Islam et al. (2017) also segregate casualties from falls in several areas: falling during the steel frameworks, falling from unprotected edges, lift shaft or staircases, falling during slab concreting, plastering and exterior painting and unmindful slips. Besides the falling, other causes of fatalities are from electrocution, the collapse of a scaffold, formwork removal, gas explosion, and exhaustion.

The magnitude of accidents: Winge and Albrechtsen (2018) mention the construction industry as the industry causing the highest number of accidents and fatality in Norway. The average rate for fatal accident rate is 4.1 during the period of 2012–2016 was 4.1 (per 100,000 workers). In Malaysia, as of DOSH (2018) and Borneo post (2018), the overall occupational accident rate (per 1,000 workers) and fatality rate (100,000 workers) is 2.81 and 4.21 in 2015 respectively that rises to 2.93 and 4.90 respectively in 2017. In particular, the fatality rate (per 100,000 workers) for the construction industry rises from 7.26 in 2014 to 10.74 in 2015 and keeps continuously increasing which turns 12.78 in 2016

and 14.94 in 2017. In India, only due to structural collapse, an average 2,658 people die which is equivalent to 7 counts a day; Dutta et al. (2015) and Kamalnataraj and Ramasamy (2015) point that India has the highest accident rate in the whole world which is 165 and fatal accident frequency rate of 15.8 in 1000.

In Pakistan, as Zahoor et al. (2017) notes, the injury rate in the construction industry remains more or less unchanged since 2007, with a consistent rate of 14.1%. Though the industry is ranked as the third most vulnerable industry, in consideration of the accident rate for the number of people employed the rank becomes highest among the industries for Pakistan. On the other hand, In Bangladesh, in 2017 alone, as OSHE (2018) reports, the construction industry counts 179 cases of fatality, which is 21.76 percent higher than that of 2016. Followed by the transportation industry, the construction industry of Bangladesh is regarded as the second-highest industry counting industrial accidents and fatalities.

Dissimilarities in context: Government of Malaysia (2015) differentiates general workers, skilled workers and semiskilled worker: skilled and semiskilled construction workers should have certain level of skill, knowledge, qualifications and experiences outline by Lembaga Pembangunan Industry Malaysia, on the other hand, general worker does not possess any skill and allowed to engage in manual work only. However, in Bangladesh, as of HBSI (2015) in BNBC of 2015, there is no differentiation of the skills among workers, nor there is any segregation of construction contractors defining organization sizes as Kamal and Flanagan (2014) notes in Malaysia.

Conversely, referring to the construction workers, both Oswald, Sherratt and Smith (2017) in UK, Baradan, Dikmen and Kale (2019) in Australia, Hungary, Spain and Turkey, Awwad et al. (2016) in Lebanon and Deshingkar, Abrar, Sultana, Haque and Reza (2019)

in Qatar note significant presence of less-skilled transnational migrant workers. Deshingkar et al. (2019) explains that migrants from less affluent and marginalized populations are dominants in notoriously low-paid and unwarranted work conditions for construction activities.

Similarly, Chakraborty et al. (2018) for India and Rahman et al. (2015), Daily Star (2016) and Ahmed et al. (2018a) for Bangladesh notes construction workers with less education, less skill, and less wellbeing. However, Reza (2016) for Bangladesh and Chakraborty et al. (2018) in India point out cheaply available internal migration of workers in construction direct from farmland to a big city in offseason, rather than transnational migrated workers. Apart from these, there are dissimilarities between these two countries as well. Betcherman (2014) notes that Indian legal system offers substantial protection to regular workers, especially in labor-intensive industries, on the other hand, for Bangladesh, Chowdhury (2017) notes enormous deficiency in decent work and extensive violations of fundamental labor rights and labor laws in all labor sectors due to situations from defects in the labor law system and weak enforcement.

2.12 Organization as an open system : operation and components

Shafritz, Ott, and Jang (2016) acknowledge that organizations hold a purpose, attract participants, attain and assign resources to fulfill its purpose, follow structural forms to segregate and direct activities and rely on few certain members to lead or manage many others. Harris and Nelson (2008), Miller (2012) and Long (2013) hold that open system is in internal and external interaction for the primary task of survival in a continuous cycle of input from the host environment, transformation within the system, and output to the host environment.

The effective function the open system organization is reliant on functioning of

several internal subsystems, wherein each subsystem conducts processes fundamental to organizational operation; Sahni and Vayunandan (2012), Bess and Dee (2012), Daniel (2010) and Dougherty (2014) mention of the five subsystems for open system: production or technical subsystem, supportive subsystem, maintenance subsystem, adaptive subsystem and managerial subsystem. The production or technical subsystem deals with the transformation process of raw material into a product. Supportive subsystem involves aiding the technical subsystem, maintenance subsystem facilitates uniting the people into their roles, adaptive subsystems concern long-term survival in the environment and the managerial subsystem concerns controlling, coordinating and directing other subsystems of the system as well as maintaining congruency of the entire system with its environment.

2.13 Organization in the environment

Sundström and Hollnagel (2006), Miner (2011) and Shafritz, Ott, and Jang (2016) explain that organization, as an open system is influenced by and at the same time has to impact on environments they operate. Due to constantly changing behavior of organizational environments, though the primary constituents remain somewhat constant, their objectives, structures, work process and techniques for coordinating activities repetitively vary largely. Daft (2016) explains that the organizational environment can be understood by the organizations' domain or the environmental segment that the organization selects to act directly and indirectly. The task environment has direct interaction with the organizations and directly affects organizational ability to attain its goal. On the other hand, the general environments are the external elements that are not directly connected with the organizational day-to-day operation; however, they potentially influence the functions secondarily. Shafritz et al. (2016) point markets, technology, politics, societal culture and sub-cultures as the environmental components for the

organizations.

2.14 Human involvement in the system

Bess and Dee (2012, p.247) mention that organization is constituted of individuals and holds functional positions or roles which are “interrelated and connected through mutual expectations”. These functional positions are structured in three major hierarchical layers: technical, managerial and institutional. The technical level involves into core transformation task of output from input, managerial level involves integrating input and output with the technical layers as well as aligning the functions of transformations and institutional level engages into diverse and complex intra-organizational and extra-organizational roles.

Cole (2004) and Daniel (2010) mentions open system organizations are social systems where behavior is founded on the role and prescribed by norms and underlying value. However, Kelly (2006), Smither, Houston, and McIntire (2016) and Shafritz et al. (2016) note, organizations are indispensable parts of the society and culture wherein they stand and operate. Human behavior has the reflection of its culture, belief, values, expectations, and understanding of norms; as people take in their psychological necessities and tendencies to the workplace, it has its influence in organizations as well. On the other hand, Angle and Perry (1981) and Smith, Organ, and Near (1983) acknowledge that being solely reliant on prescribed behavior makes a social system fragile. Therefore, for the functioning of an organization, the essential behaviors are not limited to entering and remaining in the system but also being motivated enough to exhibit dependable behavior as well as innovation and spontaneity.

2.15 The interconnectedness among individual, organization, and environment towards an unsafe situation: literature review

No organization is entirely self-sufficient; Pfeffer and Salancik (2003) and Daft (2016) explain that regardless of the size, structure or operations, organizations are both connected and dependent on the transaction with other elements of the environment to secure the required resources. These connections are through alliances, associations, customer-supplier or competitive relationships, and a social-legal apparatus that outlines and control the nature and extent of these relationships.

Murphy et al. (2014), Carayon, et al. (2014) and Niskanen et al. (2016) acknowledges that the design of the work systems is constituted by technology, human and their joint optimization in organization and environment where the work takes place. A task is executed in a working system in combination with numerous elements of human, task dimensions, technology or instruments, work context and organizational elements attributed to that task; thus, neither of these elements is alone responsible for maintaining the work system safe.

Pfeffer and Salancik (2003), Mohammadfam, Ghasemi, Kalatpour, and Moghimbeigi (2017), Harvey et al. (2018) and Heffernan, et al., (2018) perceive that unsafe situations are mostly originated from organizational contexts and in the socio-technical settings wherein a human acts rather than evolved from direct physical reasons or human actions or decision. Therefore, in predicting and preventing physical or psychological harm, the understanding of the human role, context, and interactions bear major significance.

On the other hand, the organizational environment can have its effect on the organization's outcome without creating any disturbance on its behavior, thus, elements

from the environment that potentially influence the outcome might remain unnoticed in decision making on organizational actions. Therefore, it is urged to take account of both systematic factors and environmental factors in understanding unsafe situations.

The following sections are elaborate on the environment, organization and human attributes and their interconnection in terms of unsafe work in recent pieces of literatures.

2.15.1 The contribution of the environment in an unsafe situation at the workplace

Shafritz et al. (2016) and Jain, Leka and Zwetsloot (2018) indicate that, both the environment wherein work is done and the type of work done have significant influence on the safety and wellbeing of the individuals that perform the work. In particular, issues like trade liberalizations, continuous development in transportation and communication, advancement in technologies change in labor patterns and demographics or shifting organizational practices are adding new patterns of challenges to the workforce's wellbeing every day. Particularly, as noted before, Daft (2016) and Shafritz et al. (2016) both mention of organizational environment in terms of the task environment and general environment on the perspective of direct and indirect relation; and, include markets, technology, politics, societal culture and sub-cultures the environmental components for the organizations. The literature review of the construction industry environment proceeds in terms of those environmental constituents.

Industry, market, and client: Though the developer initiates the construction process to vend residences in gaining revenues, there is involvement of various types and sizes of the organization on a single work. The construction industry is unlike other for its unique product, convergent, temporary, fragmented supply chain and requirement of wide trades and materials. Akintan and Morledge (2013), Myers (2013), Vidalakis, Tookey and Sommerville, (2013), Łaszek (2016), Sherratt (2016) and Stiles, Ryan and Golightly (2018)

extend, a single firm alone cannot accommodate itself all the versatile expertise that a project needs; and under demand uncertainty, there needs integration of assortment of organizations into project implementation as multilevel subcontracting; eventually, there is dispersed range of value and belief in terms of safety in a project, more fragmentation and shifting the work pressures and risks to the next level.

Accommodation being one of the most fundamental necessities and the demand for housing is continuously increasing with demographics. Chia, Harun, Kassim, Martin and Kepal (2016) and Mulliner and Algrnas (2018). Myers (2013), Aziz, Ali, and Hassan (2014), Łaszek and Olszewski (2015) and Łaszek (2016) hold that this industry's market as highly concentrated, highly heterogeneous, highly uncertain and constantly changing. In particular, affluent developers monopolize the market largely; as of Abbasianjahromi, Rajaie, Shakeri, and Kazemi (2016) and Polat (2016), the control shifts to larger firms and develop additional concentration. Main contractors play as construction management agents; out 80-90% of work is subcontracted to trade subcontractors, specialist subcontractors and labor-only-subcontractors to keep the risk to return ratio low wherein quoted price becomes the determinant of the subcontract, if not by an acquaintance.

Brezis and Wiist (2011), Swanson (2013), Mogensen (2015), Theodore (2015) and Pang (2018) explain that profitability is reliant on the decentralization of low profile works and this widens the growth of small, scattered and mobile contractors and downgrades the employment condition. Moreover, through the mechanism of subcontracting, that is, the extraction of gain from the immediate level below and securing control over competitive advantage obstructs the concern for safety issues. Safety becomes an externality, eventually, the personal responsibility of the employee himself. Particularly, in Bangladesh, the housing construction industry, Reza (2016) and Ahmed et al (2017)

mention, 20% of the industry turnover taken by 2.5 million construction workforce is engaged through more than 5000 firms tied in the multilayered subcontracting system. There, the informal labor subcontracting system serves as securing capital through offering cheap flexible workforce take precarious work, wherein, they bear threats of wellbeing.

On the other hand, in this industry, Jackson (2010) and Hughes and Ferrett, (2013) understands due diligence as a process of locating an area of concern that is taken in consideration in decision making at the preconstruction phase, that is, employers shall take all practical protections under a given situation as prevention even if not covered by the legislation. Moreover, Lingard and Rowlinson (2005), Jacobs and Forst (2017), Kerzner (2017), Liu, Jazayeri, and Dadi (2017) and Zhang and Zou (2017) urge to include client or owner of housing in taking the strict role so that safety considerations are taken in design and execution. However, as of Sunindijo (2015), risk-taking is nothing isolated from the task when the investment on compliance does not pay off with business revenue. Thus, clients' minimum price preference dominates the selection of contracts and firms with financial instability risk working safely to persist in the highly competitive market.

Moreover, in the study of Mulliner and Algrnas (2018), among the 33 attributes that guide a client's preference in choosing a property, the concern of safety or due diligence is not noticed from clients. Moreover, as of Sacks et al. (2015) and Umeokafor (2017), not only there is a legislative gap in specifying client role in safety concerns during construction, but also the attention of the designers in eliminating hazards are centered around the clients or occupants. In Bangladesh, as of Ahmed et al. (2017), Gupta (2017) and Srivastava (2017), not only the real estate market is exceedingly competitive but also its clients are highly-priced sensitive. Moreover, Kamal and Pramanik (2015), Kamal et al. (2016), Khare and Kader (2016) and Jamil, Hossain and Siddique (2018) that the clients'

preference in choosing to house is directed by location of social institutes, transportation, financial flexibility, physical facility of the establishments, neither safe design nor safe construction.

Thus, in various country contexts, pieces of literature like Theodore (2015), Sunindijo (2015), Umeokafor (2017) together generate thoughts of association safety at work in the construction industry with clients, market and industry. Pieces of literature like Kamal and Pramanik (2015), Reza (2016), Ahmed et al (2017), Srivastava (2017), Gupta (2017), Jamil, Hossain, and Siddique (2018) also substantially illustrate on client, market, and industry related to Bangladesh construction. However, the researcher (within his limitation) observes inadequacy in present safety-related pieces of literature in Bangladesh about the contribution of client, market and industry to unsafe situations at construction industry; particularly in accident causation literatures on Bangladesh construction industry like Rahman et al. (2015), Islam et al. (2017) and Ahmed et al. (2018c).

Technology and labor force: The technologies in industries aim to separate human from direct hazardous action, trim production cost, task completion with precision, controlling adverse effect on the environment, work where manually not accessible, provide additional operation information, more work manageability and ultimately reduce manning rather than to replace human applications completely. Horberry, Burgess-Limerick, and Steiner (2011) and Sepasgozar and Davis (2018) extend that new technologies potentially change the operation behavior and task interface; however, technologies are often fast developed, made available and eventually deployed without detail and systematic assessment of task and operator perspective; eventually there are issues like negative adaptation and unfitting ergonomics that cause cognitive overload and unsafe engagement.

On the other hand, for the developing countries, Mustapha et al. (2018) characterizes construction industry as labor-intensive, accustomed to primitive technologies and in a dire need of knowledge and awareness of occupational health and safety. Particularly in Bangladesh, Rahman and Mayer (2015), Talukder and Jahan (2016) and Alam et al. (2017) point that the light engineering enterprises are shifting from the maintenance of imported machinery to manufacturing spare parts with limited resources and skills. Though, there is Agricultural Machinery Standardization Committee for testing and standardization for locally made farm equipment, for the other light engineering products BSTI (Bangladesh Standards and Testing Institution), has no cooperation in this regard. Eventually, these industries suffer from deficiencies in machinery, skill, and knowledge in design, process and quality knowledge and ultimately, there are compromised quality, capacity and reliability in operation for these industries' products, including construction equipment. In terms of the use of technology in Bangladesh construction industries, Ahmed et al. (2018c) and Sasaki, Seike and Kim (2018) explain, owners have the priority of cost and easy availability of the equipment and subcontractors prefer to stick to already accustomed old work process. There is low graded equipment in action for construction sites in Bangladesh. Though these Bangladeshi pieces of literature do not shed light on the contribution of local technology in unsafe situations, Donaghy (2009) acknowledges the existence of equipment which quality is not assured in UK construction industries and that contribute to the rising number of accidents.

In terms of education, Dijk, Bubas, and Smits (2015) finds that the quality and coverage of occupational health and safety education among the developing nation is unacceptably low. Particularly in Bangladesh, Biswas (2014), Husain and Osswald (2016), Mamun-ur-Rashid and Rhman (2017) and Sultana (2018) acknowledge that higher

education as qualitatively feeble and dysfunctional since the colonial period. The students have a deficiency in critical understanding and philosophical sufficiency. The unfitting curriculum is unable to deliver any practical or critical knowledge for the labor market. In the technical universities, the continuous development of curriculum is restricted.

Besides, there is a weak skills development culture across skill-developing institutes in Bangladesh as well. As of Hearle (2016), Naznin and Karim (2016) and Dewan and Sarkar (2017), the technical and vocational education are predominantly non-synchronized and there is a deficiency in overall allocated resources. The TVETs (Technical and Vocational Education and Training) are in isolation from industrial hubs. Besides, entry requirement of minimum eight years of formal schooling for technical schools, too long-termed and too expensive courses restrict skill development options for these short-termed and financially burdened construction workers who are early school dropouts with poor literacy and numeracy. As of Reza (2016) and Hearle (2016) and Ahmed, Islam, Hoque, and Hossain (2018a), these construction workers in Bangladesh construction workers (53.94%) have no education at all and eventually, learn skills on the job from tradesmen through trial and error at sites. Though, among the French apprentices, Boini, Colin and Grzebyk (2017) finds that workplace injury among individuals with no occupational health and safety education is two times higher than that of individuals with previously received education at school. Despite these Bangladeshi pieces of literature mentioning the deficiency in current education and skill development system, they do not clearly elaborate about the contribution of them to unsafe situations, particularly in construction industry.

Society and government: Culture is the set of shared beliefs and behavior built in the process of social interactions with geographical and socio-economic contexts. As of

Bristol and Scott (2014), Liu, Meng and Fellows (2015), Habibnezhad and Esmaeili (2016), Flynn, Castellanos and Flores-Andrade (2018) and Huanga and Crotts (2019), the expectation and preference of an individual is deeply rooted in shared social and cultural value system and convergence of preference of values. Moreover, these potentially influence on how individuals from different demographic segments observe, realize, accept and respond to concerns of safety. In addition, Oswald, Sherratt, Smith, and Hallowell (2018) hold that safety itself a shared concept. Thus, what is shared as right or wrong, rational or irrational, fair or unfair which indicate safety in construction industry. However, this is quite contradictory with Stergiou-Kita et al. (2015), Nielsen et al. (2015) and Al-Bayati, Abudayyeh and Albert (2018), who interpret construction industry safety in terms of the extent of masculinity, non-expressive or reluctant to communicate safety concerns from high power distance and inclination to collectivism,

Apart from these, Lewis et al. (2015), Theodore et al. (2015), Strauss and McGrath (2017) and Pang (2018) explain that neoliberalism builds the practice of informal employment practices through creating demand and supply of migrant labor, informal recruitment flexibility and precarious nature of work. The firms tend to rely on casual employment and filling up low-wage employments to gain greater labor market flexibility and cost control. On the other hand, conditions like being below the minimum level of required skills, inadequate employment opportunities or dislocation from previously prosperous job sectors are few of the reasons that drive people to join in low-pay, unstable, manual labor demanding and accident vulnerable casual labor markets. For Bangladesh, Ye (2014), Reza (2016), Lata (2017) and Islam, Siddeqa and Biswas (2018) acknowledge that smalls farmlands with exceptionally low output drive farmers for non-farm employments especially in offseason, thus, the capital city Dhaka experiences internal migration of

300,000 to 400,000 yearly. In particular, due to no requirement of skills or qualifications and on-site accommodation, the construction industry becomes the most favorable destination of this low safety conscious and indigenous knowledge equipped rural individuals.

Despite the socio-cultural background of individuals being associated with individuals' perception of safety and particularly, as of Theodore et al. (2015), greater likelihood of accidents in migrated workers, the Bangladeshi literatures that describes on trans local migrant workers into construction industry do not shed light on the contribution of of this migration in unsafe situations at workplace. Though the Governance as institutions form general norms of the society, as of, Liu, Zhao, and Li (2017), the unfitting legislation, policy loopholes, insufficient sanctions, and incongruous government interference can sustain inappropriate behaviors. In construction industries, the prescribed and specific standards are formed to present the minimum acceptable requirements that might be proven inflexible to technological change and inappropriate to deal with new risks; moreover, this threshold requisite is likely to be the standard norm established by the employer. As of Lingard and Rowlinson (2005) and Okun, Watkins and Schulte, (2017), generally, the standards are translated as general duty provisions for stakeholders and more focused on non-statuary terms rather than being prescriptive or detailed; therefore, there needs the feedback on government regulations to necessitate revisions of standards to check adverse effects.

The Bangladesh legal system, as of Mahmud (2007), Khan and Swapan (2013), Sabet and Tazreen (2015), Ahmed et al. (2017), Chowdhury (2017), Ahmed et al. (2018d), and Rahman (2018, p.98) and Rashid and Johara (2018), suffers from overabundance of laws and policies, defects in the labor law system and weak enforcement or non-

observance of labor rights. Moreover, the history of transactional corruption is long and strong throughout the institutions. In relation to the construction industry, there is a wide gap between codes, rules, and actual practice. There is a shortage of adequate inspectors, restricted logistics and transport support, lack of legal authority, and improper/ineffective inspection services and non-cooperation by the employers in the Department of Inspection for Factories and Establishments (DIFE). Moreover, the statutory body for issuing an approval for building permission, RAJUK, is accountable for most violations of very regulations that it is responsible for enforcing.

Though for Chinese construction, as of Jong, Henry and Stansbury (2009) ns Liu et al. (2017), the incurred cost in corruption leads to substandard work process and limitations of legislation and enforcements yields inappropriate behaviors and risks, the mentioned Bangladeshi literatures on corruption in construction institutions do not shed light its contribution to the unsafe situations.

2.15.2 The contribution of the organization in an unsafe situation at the workplace

Unsafe situations evolve from psychological, technical, managerial and organizational surroundings; both Górny (2017) and Hoła, Sawicki and Szóstak (2018) sorts out the influencing factors of unsafe situations as man, machine, methods, management, material and work context for a particularly unsafe situation. However, as of literatures including Hoła et al. (2017), Eskandari, Jafari and Yadollah Mehrabi (2017), Daudigeos, Jaumier and Boutinot (2017), Madsen and Waldor (2019), and Zhang et al. (2019), the management of a work environment is not only about the conformity of legislation but also wider aspects of roles and interactions; thus management perception, incentives, safety knowledge are acknowledged as contributory organizational factors for safe or unsafe situations.

For the open system, Bess and Dee (2012), Elmore (2013) and Long (2013) understand that the primary task is the most crucial element that each system or subsystem requires to do to survive, however, there is requirement of involving reward and compensation to facilitate human dynamics in getting the work done. Besides, Bess and Dee (2012), Dekkar (2017) and Serrat (2017) hold that both system and its process behaviors are guided by the way its transformation and control mechanisms experience environmental interaction wherein fitness of the organization rests in its adaptability, coherence of identity and ability to observe the external environment appropriately; that is the organizational culture of inventing, discovering, and developing is crucial in coping with its challenges with external adaptation and internal integration. Thus, the literature review of the construction industry organizations proceeds in terms of function, its management, reward and sanctions, and adaptation.

Organizational function: Coze (2019) understands that the challenges of an organization remain in between exploration of new possibilities and exploitation of existing assets, and at the expense of one another. If the organization is struggling to overcome some limit, as a consequence, organizational members are pushed for extreme performances. Literatures acknowledges that potential financial gains from taking risk are widespread; as of Sherratt (2016), Sherratt and Sherratt (2017) and Tchiehe and Gauthier (2017), enterprises avoid rules, norms, and best practices; thus, risks are embraced or tolerated for cost reduction in the work process. Particularly, in the construction industry, the lowest bidding being the basic mechanism of survival in the multi-layered competitive tendering process, profit is mostly harvested by shrinking budget for the next level, so does the investment for safety.

Theodore et al. (2015), Valluru et al. (2017), Garnica and Barriga (2018) and Wiengarten and Longoni (2018) explain, the larger contractors decentralize low-profile works as a strategy of profit-making and that becomes a market for survival for the ever-growing insignificant and scattered contractors. Lowering the cost to the bottom is the approach that enables struggling enterprises to secure contracts in a highly competitive subcontract market; eventually, there is an inclination towards casual labors that requires minimum attention for wellbeing, involving substandard technology, allotting inadequate resources and time as cost limiting strategies in construction firms.

For Bangladesh construction industry, As of Rahman et al. (2015), Reza (2016), Hasan et al. (2017), Srivastava (2017), and Gupta (2017), Ahmed et al. (2018) and Ahmed et al. (2018c), not only the market is outstandingly competitive, there are builders' price preference and price-sensitive multilevel labor subcontracting, both demand and supply of unskilled uneducated urban migrant labor, and tendency to ignore protective equipment and compliances to avoid supplementary costs. However, in the mentioned Bangladeshi pieces of literature, there is an absence of a clear and comprehensive picture of what factors the organizational function contributes to an unsafe situation for the Bangladesh construction industry and how they contribute.

Reward and sanction and safety: Intensifying profit motives through manipulation of process, policies or structures to shift overheads to externals and keep profit inside is an organizational dysfunction. Jurkiewicz and Giacalone (2016) also include immediacy as a symptom of dysfunction, whereby, the reward system favors just-in-time performance and rebates on long-term performance. In construction industry, as of Bakker and Demerouti (2007), Hansez and Chmiel (2010), Sherratt (2016), Brewer, et al. (2017), Dahl and Kongsvik (2018), Bronkhorst (2018), Pang (2018), and Trinchero et al.

(2018), firms are under pressure of cost struggle due to multilayered price-sensitive supply chain and timely delivery of projects. Besides, the payment practice moves on the basis of per unit completed work. Eventually, managerial precedence shifts to progress, the matter of safety is separated from work practice to meet timely target under strict cost ceiling.

Zohar et al. (2015) mention of it as melioration bias (choosing immediate and high-likelihood outcomes over delayed and unsure outcomes). Similar tradeoffs are also noted in construction industry in literatures including Conchie et al. (2013), Bosak et al. (2013), Zohar and Polachek (2014), Amponsah-Tawaih and Adu (2016), Kvalheim and Dahl (2016), Gravina et al. (2017), Fan and Zhou, (2018), Dahl and Kongsvik (2018) and Pinion et al. (2017) and distinction from work engagement and work overloads are suggested to avoid unsafe situations. On the other hand, Sherratt (2016), Oswald, Sherratt and Smith (2017), Smith, Sherratt and Oswald (2017) and Coze (2019) mention that, if safe work practices are rewarded, being safe turns to be a norm at workplace; conversely, an unsafe act persists if that particular task yields rewards in some form. Any reward scheme stimulating speed and risk-taking, especially a monetary one, potentially generates unanticipated or undesirable behavior as a byproduct of the scheme initiated. The case of BP Texas City refinery explosion in 2005 is an example where encouragement of cost curtails by senior management led the reward-seeking lower management to ignore safety measures.

Though the mentioned studies on Bangladeshi acknowledge the cost shrinking perspective of local builders and involvement of unskilled workers or restrict resource acquisition, they do not shed light on the existence of a reward system in the construction industry, nor how they contribute to unsafe situations for the construction industry.

Management of construction project: The planning and execution together are accountable for the complete or partial failure of the project. Kerzner (2017) extends that this fiasco is not limited to inconsistent financial estimation, unclear or unrealistic expectations, nonappearance of systemization of planning, inadequate information for decision making, uneven priority of technical and business objectives, missing attention for human and organizational aspects of the project and non-involvement of end-user through project or lack of sense of ownership. On the other hand, as of Jurkiewicz and Giacalone (2016), both invariance and obduracy are characteristics of dysfunctional organizations, wherein, management stays confined to their own opinions or prior course of action of doing things, thus effective problem solving by professionals are discouraged.

Observing construction industries in South Asian and south-east Asian countries like India, Pakistan, Afghanistan, Sri Lanka, Malaysia, Indonesia and Vietnam, Islam and Trigunarsyah (2017) note of inconsistent planning and scheduling, loose integration of project and irregular cash flow as common challenges for project execution. Particularly for Bangladesh, the challenges are mentioned as unfitting planning and scheduling, financial obstacles of both contractor and owner, and feeble site management. Similarly, as of Islam and Suhariadi (2018), the building construction industry fails to demonstrate adequate professionalism in project management practices; there is inappropriate feasibility assessment, poor or partial financing, unfitting planning and scheduling from the owner, improper time and cost estimation from contractors and incorrect progress monitoring and cost controlling along the project life in Bangladesh building construction projects.

Winge et al. (2019) finds project management issues as one of the 7 most causal factors connected with construction accidents that occurred in Norway for 2015 and identify project management elements like unclear responsibilities, the unfamiliarity of

work, scheduling, lack of control over project and participants. Despite the Bangladesh pieces of literature mentioned, acknowledge inappropriate management for Bangladeshi construction industry projects, the contribution of project management in unsafe situation remains unclear.

Organizational adaptation, knowledge, and safety: Every project is a complex adaptive system itself, as Duffield and Whitty (2015) explains, throughout its lifetime a project evolves through adaptive exploration and conversion of information under competitive pressure from complex business operating environment so that lessons are learned and mistakes of the past are not repeated. In finding and adjustment of errors, as of Wang, Zou, and Li (2016), it requires the supervisor's initiative to enlighten on all possible risks, dedication in the innovation of measures and facilitation of knowledge or skills.

However, for construction firms, as of Nesheim and Gressgård (2014), Kvorning, Hasle and Christensen (2015) and Loosemore and Richard (2015) and Rostami, Sommerville, Wong and Lee (2015), lessening short-term capital costs, exploiting predictability of outcome through risk relocation and lowest price paradigm certainly restrict progressive thinking. Implementation and level of reception of learning are reliant work experience, training, inner motivation and management support; therefore, the professional inadequacy in terms of individual knowledge, experience and behavior to understand the rationale of risk mitigation; besides, diverged perceptions of among parties involved into the projects are the barriers for integrating risk management at work site.

On the other hand, it is the organizational culture that determines the project team members' decision to share or exchange project-related information; however, as of Wei and Miraglia (2017), frequently in projects, there exists the tendency of exhibiting protectiveness of their knowledge. Takhtravanchi and Pathirage (2018) also notes of an

absence of awareness, contribution, and management of tacit knowledge in construction sites; particularly, the design teams remain distant from the construction teams due to the disjointed activities and lack of mindset to share. For the Hong Kong construction industry, Yiu, Szeb, and Chan (2018) finds preparing project members inadequately with the knowledge to work safely becomes a barrier in the implementation of a safety management system. For the Bangladesh construction industry, Islam and Suhariadi (2018) mentions of deficiency of skill and professional knowledge among managers, builder's dependency on external consultants on project information as well as frequent safety violation in building projects; however, its contribution to an unsafe situation is not made clear.

2.15.3 The contribution of the individual in an unsafe situation at the workplace

Individual factors are about interactions of humans with the instruments at work, the context of the work and living; on the other hand, at the basic understanding of accidents there is the chain of events consequence by human errors. Dhillon (2018) explains inappropriate activities, incompatible responses, and physical and mental overload from situations, personal and contextual attributes lead a human toward the erroneous performance of tasks. Even though both Reason (2016) and Proctor and Zandt (2018) mention of both errors and violations in explaining the unsafe act, they draw a partition between errors and violation where errors are informational adequacy and violations are backed by motivation.

Lupton (2013), Glendon and Clarke (2016) and Syed and Kramar (2017) hold that individual attributes like age, gender, personality, disposition habits, motivation, attitudes and experience in connection with risk perception or risk-taking consequences. In conforming to social norms, men engage in risk-taking activities which symbolize masculinity; conversely, the feminine perspective of risk is interpreted as careful avoidance

of danger making a female behave passively to threats rather than act like the male counterparts.

However, in terms of risk-taking, Scales and Irwin (2009) and Duell, et al. (2018) does not confine to biological perspectives and extend to psychological and environmental aspects. That is, the manner in which risk tendencies translated into risk activities displayed in the real-world also depends and varies on the sociocultural contexts. Besides, despite the fact that personality potentially influences inclination for cognitive failure, Glendon and Clarke (2016) accept that it is not possible to establish a particular accident-prone personality. Despite the accurate risk, perception is a critical cognitive skill for any individual to remain safe that starts from the act of sensing, perceiving a risk involves the influence of multiple interconnected levels presenting neural, cognitive, behavioral, social and cultural grounds.

In terms of culture, Oswald et al. (2018) accepts that individuals' way of thinking and actions are yielded from their attitude toward a task, authority, communication patterns, efficiency concern, and styles of learning. For the construction industry, Sherratt (2016), Al-Bayati et al. (2017) and Al-Bayati et al. (2018) note that as safety is a shared concept at the workplace, how the people at site commonly view what is safe and what not determines safety for all. Besides, particular site culture plays a significant role in construction safety; familiarity with work yet unfamiliarity on work context might affect a safe workplace. Similarly, Guo et al., (2016), Shen et al. (2017) and Casey et al. (2017), and Hald (2018) point that shared social context as strong base of individual task engagement, thus, individual work extra safely in presence of a shared social context that highlight and value safety at work. Tighter interpersonal affiliations can augment group cohesiveness in information sharing to prevent unsafe situations.

As of Hom, et al. (2009), Bal (2016), Liang et al. (2018) and Wang, Long, Zhang and He (2018), the social exchange in Quasi-spot contracts employment between employee and employer is comparatively lower and roles takes significant place in relation between employee and employer. As construction work is executed in scattered small groups at different phases of execution; group member is at closer proximities as well as under a higher level of social influence than that from the employer or supervisor. Similarly, Fang, Wu, and Wu (2015), Guo et al. (2015) and Choi, Ahn, and Lee (2017) point of group norm having potential influence individual at the workplace in terms of safety; however, negative pressure from peers yield tendency for violating behavior as well.

From Bangladesh's perspective, Reza (2016) and Islam et al. (2018) state that, from rural farming sectors, significant people come to urban areas for work and mostly join the construction industry. These people hold the mindset that is groomed through working in indigenous knowledge and ambient with no safety awareness. In addition, both Reza (2016), Ahmed et al. (2018) and Ahmed et al. (2018a) mention that a substantial volume of these construction workers with limited experiences and skills. Reza (2016) not only notes that migrant workers are brought at both unskilled and semi-skilled level but also the group formation of unskilled migrant workers with skilled ones at work. Pieces of literature like Duell, et al. (2018) notes involvement of socio-cultural contexts and Guo et al., (2016) and Hald (2018) note on group influence on safety for foreign construction industry context; though Reza (2016) and Islam et al. (2018) depict both sociocultural contexts of the dominant construction workers and mention of their practice of working in groups. However, the researcher fails to find clear information of the involvement of this cultural context and group dynamics with unsafe situations for the Bangladesh housing construction industry.

2.16 Recent studies related to the factors contributing to the unsafe situations at the workplace

Hudson (2014) points out that the notion of understanding the underlying agents of unsafe situations widely target at the decision who and how it caused either for imposing liabilities or for preventive measures. Thus, identification and classification of contributing factors as well as determining their mechanism is unambiguously associated with the success of eliminating them by the governance of the system through reformation and discouragement. However, the accident is originated from complex and irregular combinations of factors; therefore, any simple linear deterministic approximation is subjected to hindsight biased, and eventually turns inaccurate.

Hudson (2014), Hudson and Hudson (2015), Grant et al. (2018) and Grant et al. (2018a) hold that the factors influencing the accidents lay widened and away from the immediate site of happening, and convince to include organizational discrepancies as well as cultural and regulatory factors in analysis and understanding of accidents rather than solely pointing on human error observed in recent pieces of literature. However, Hudson and Hudson (2015, p.171) notes that there is still an absence of "disciplined approach references to cultural and social contexts" which indicates a little 'rigor' and "little more than well-intentioned hand-waving; thus obstructs the objective of complete understanding as well as prevention. Apart from this, Grant et al. (2018) note that heavily focused end error events, questionable appropriateness and numbered perspective of accidents persist as a major drawback in typical predicting methods.

Reason (2016) perceives of uniqueness in causation behind every safety case. The causation and formation of happenings are spread over a wide domain; however, prediction of accidents are viewed mostly from the regulators' perspective and the limited technical

domain is covered, thus the human or organizational domains become insignificant. Tweedy (2014), Dekker (2015) and Woods et al. (2017) view accidents as consequences of a complex interaction of multiple agents rather than simplistic Cartesian–Newtonian cause-effect interpretation of accidents; hence, suggest for holistic views of happening to understand accidents.

On the other hand, Maryani, Wignjosoebroto, and Partiwi (2015) propose a casual loops diagram of construction accident featuring the complexities of the formation of unsafe situations. The study considers various influencing agents including worker's characteristics, construction work environment, safety management, and protection system as linked to accident rates; thus fails to depict a holistic understanding as the organizational environment is not clearly presented. Similar inadequacy is observed in the study of Hoá and Szóstak (2014) and Soltanzadeh et al. (2017) too. In the prior study the development of the accident situation is analyzed on the basis of the work environment, work process and work action and the latter individual and organizational factors, safety training factors, risk management system indicators, in both cases attention centers the organization.

In exploring causation pattern of accidents in Andalusian manufacturing sectors on accident investigation reports, Carrillo-Castrillo et al. (2016) finds out a wide range of latent and active causes grouped under personal factors, safety management, work organization, material and substance, equipment, machinery, installation, and workplaces; however, the study does not shed much light on social factors or group dynamics. Similar inadequacy is observed in the study of Carrillo-Castrillo, Trillo-Cabello, and Rubio-Romero (2017) for the Spanish Construction industry as well. On the other hand, Huang et al. (2018) understands accident on the basis of new paradigm of Safety-related Big Data (SRBD); as a proposition, the study takes in individual, task, technology and organization-

related information as safety information to be filtered through accident causation theories (safety law) to avail safety knowledge. However, the information taken as input is contextual and also immediate to the accidents.

Out of the studies of causation for accidents in construction, the work of Rowlinson and Jia (2015) remains extraordinarily different from the tradition of focusing factors immediate to the occurrence. For the Hong Kong construction industry, in search of causes of heat stress-related accidents, this study finds factors from ecosystem level, society level, Industry level, permanent and project organization level, team level, job unit level, and individual level. Even though the study presents a holistic picture of causation for the Hong Kong context, due to nonappearance, the study still fails to give a hint for a context where social discrepancies like bribing are salient as noted by Sabet and Tazreen (2015) in Bangladesh. Moreover, the study confines only heat stress which, as of Islam, Razwanul and Mahmud (2017), does not stand as a risk for Bangladesh.

Studies like Bellamy (2015) and Marshall, Hirmas, and Singer (2018) consider the accident triangle established by Heinrich (1931) to constitute the interpretation of gravity of accidents with its volume in numbers. However, Dekker (2014, p.125) explains that this assurance of fixed proportions and ordinary cause lead to destructive consequence on understanding of risk and safety; its inherited misconception of controlling through the false idea that we can control the risk of an enormous catastrophe “by counting, recording, tabulating and suppressing the small stuff”. It is also criticized by Manuele (2011) and Besnard and Hollnagel (2014) for firmly holding that error generates from the human belonging to the worker level only. However, still after about 90 years since the postulate that Heinrich made on accident causation as human unsafe acts causes 88% of the

accidents, Ness (2015), Viramuthu (2017), Gravina, Cummins and Austin (2017) and McSween and Moran (2017) hold Heinrich's model in safety-critical industries.

In capturing the unsafe behaviors in construction Khosravi et al. (2014) proposes a wide range of factors belong to society, organization, work context, contractors, project management and individuals based on literature meta-analysis. On the other hand, based on another meta-analysis Mohammadi et al. (2018) proposes a holistic framework of at levels of government, organizations, project and individual level; the environmental consideration is limited to governments' legislation and ignored other societal components at the environment and workgroups.

Besides, Williams et al. (2017) design, client, contractor, construction operatives, and site factors for behind the accident in a metanalysis too. All these three works are limited to proposition rather than forming it on context followed by an explanation of how these factors are involved with accidents. Apart from these, Meta-analysis is an influential mean of accumulating and summarizing the knowledge in a particular field, as Greco et al. (2013) notes, yet controversial due to its potential in misleading conclusions over personal bias and limited coverage. Cheng and Philips (2014) extend that at the collection level, the primary data is not collected to address the questions or context of secondary research and this leads that some variables not to be available in the analysis. Moreover, the person that collects the primary data is not necessarily the one analyzing at the secondary level, thus, there is a likelihood of misinterpretation.

Numerous efforts are made to understand the agents leading to accidental situations through accident statistics as well. From earlier literatures including Chong and Low (2014), Chi, Lin and Dewi (2014) to recent efforts like Umar and Egbu (2018), Aliabadi et al. (2018), Tarik and Adil (2018) and Winge and Albrechtsen (2018) put their efforts on

understanding accidents for a safe workplace. However, in this span of time of five years, these pieces of literature are still confined to addressing immediate factors of occurrence and the environmental perspective is not addressed.

In investigating the connection of personality to elevator related accidents in China, Rau et al. (2018) find that employees, who are more conscientious and agreeable, are likely to exhibit more compliant to regulations. On the other hand, Tao, Zhang, and Qu (2017) note that different classes of personality traits as vital individual factors like Neuroticism and Psychoticism are directly connected to accident proneness for Chinese drivers. From the perspective of group norms at the workplace in the construction industry, Pourmazaherian, Baqutayan, and Idrus (2017) propose that traits like high agreeableness and conscientiousness bring higher safety outcome for the particular construction industry. However, Glendon and Clarke (2016) acknowledge that it is nearly impossible to establish a specific accident-prone personality, and Later Duell, et al. (2018) holds that the way risk propensity is translated into risk activities is dependent and varies on the sociocultural contexts. The element of the societal context of personality attributes is not adequately reflected in none of these studies carried out by Tao et al. (2017), Pourmazaherian et al. (2017) and Rau et al. (2018) as well.

Silverman (2017) explains that in describing the ‘what’ and ‘how’ aspects of the phenomenon are suitable attended in qualitative inquiries. Though researcher finds qualitative researches in understanding unsafe situations are less common that their quantitative counterparts, the work of Gomes et al. (2016) and Zahoor et al. (2017) are quite considerable for the construction industry. The former study explores the perception of work, the difference in knowledge on rules with the difference in organization sizes, loopholes public policies as contributing elements for an unsafe work condition in the

Brazilian construction industry. On the other hand, the later study pays more attention to the organization, and identifies inadequate enforcement, over subcontracting, inappropriate managerial decisions and incompetence, deficient training and resources, lack of awareness as factors influencing accidents for the Pakistani construction industry. However, none of these two studies explain how the identifies factors influence unsafe conditions. Though, observations are made through 8 interviews from 5 categories (contractors, subcontractor, academic, client and safety official and not workers) by Zahoor et al (2017). The study not only misses to constitute dependable reasons to link participants with study aims suggested by Gobo (2007) and Palinkas et al. (2015) but also to focus richness in information as suggested by Creswell (2017) on maximal variation in sampling.

Out of a significant number of researches, the study of Man, Chan, and Wong (2017) too amazingly elaborate in detail on the effect of social and situational influence, safety-related barriers or stimulators lead to the decision of risk-taking Hong Kong Construction workers. This study particularly mentions about 60% of respondents avoid risk-taking behavior as their family would experience financial issues in cases of unfavorable consequences. On the other hand, describing Bangladeshi migrant construction workers, Dutta (2017) notes the immediate context of workplace risks are subdued by the broader contexts of familial debt and responsibility, thus, creates a contradiction with the study of Man et al. (2017) in terms of workers' priority in viewing safety.

Ternov (2011a) and Reason (2016) acknowledge every safety case is unique in terms of combination and interaction of widespread factors and varies with contexts. On the other hand, Zhao, Zhao, Davidson, and Zuob (2012), Mengchun (2012), Raheem and Hinze (2014) and Hallowell and Yugar-Arias (2016) detect this industry as dealing with project-based, dynamic, transitory and highly labor-intensive nature of work. The sites are

dissimilar in the terms work process, work environment, workforce characteristics or duration of employment as well.

In addition, Seo, Lee, Kim, and Jee (2015), Senouci, Al-Abbadi, and Eldin (2015) and Wang, Zou, and Li (2016) extends that frequent encounter with hazardous equipment, situation, and material, deployment of temporary workforces, decentralized work sites, inadequacy of co-ordination, simultaneous multi-traded works at the same place heighten the frequency of occupational injury and fatalities in construction industry. However, these elements are common to global scenarios rather than in a particular context, besides, these pieces of literature do not explain how these common inherited properties of the global construction industry lead to an unsafe situation.

Apart from this, Gibb et al. (2014) and Winge and Albrechtse (2018) mention that due to the fact that construction industry is not homogeneous, the types of accidents and their underlying sources do not only differ greatly in type, size, and dimensions of tasks and complexities but also on nations. In relation to the Bangladesh construction industry, very few efforts are made to understand unsafe situations. A Bangladeshi study, based on review of literatures from sources through literature scanning from indefinable sources, Ahmed et al. (2018c) identifies 18 probable causes including ignorance, negligence, carelessness and risk-taking behaviors from both worker and supervisors, inadequate management safety specific commitments and co-ordination, inadequate vigilance from law enforcement agencies, climate condition, inconsistent project scheduling and checks their relative value of importance through undefined number of unspecified samples from unspecified population from Bangladesh construction industry; moreover, how the factors potentially contribute to unsafe situation on context is not explained.

Based on conducted observations at sites, Rahman et al. (2015) identifies issues with an awareness of safety procedures, labor skills, project supervision, client consciousness, precaution measures influencing unsafe situations in the industry. Based on interview on-site personnel and subsequent questionnaire survey, Islam et al. (2017, p. 269 & 273) identifies falls, electrocution, structure collapse, removal formwork, gas explosion and fatigue as the "cause" of accidents Bangladesh construction industry; however, the same study holds falling, being struck, caught in between, electrocution as 'types' of accidents, which causes lack of clarity and confusion. However, this mentioned studies analyzing factor related to Bangladesh construction industry accidents mostly take neither take in consideration of wide contexts in exploring influencing factors, no any of them explain how the factors contribute to unsafe situations at workplaces in Bangldesh construction industry.

2.17 Summary of the research gaps

As noted in the previous and this chapter, accidents are a complex phenomenon and the influencing factors are widely scattered from the immediate location of an accident happening to the distal socio-cultural context. The history of attending causation of accidents is long and the notion of understanding of factors and mechanism of influencing the unsafe situations are aimed at the protection of human resources from potential harm. However, there is a trend of studies being confined to unsafe situations in a simplistic linear cause and effect as causation; thus, remain limited in a comprehensive understanding of unsafe situations. Construction is an important yet accident-prone industry globally, particularly in building construction segments. In addition, in Bangladesh, these adversities are gradually increasing.

Even though, understanding accidents are important for prediction and control, this study observes the following gaps in the body of knowledge,

a. In recent studies, the frequent consideration of factors immediate to point of occurrence put a barrier in understanding the holistic perspective of unsafe situation influencing factors, which generally indicate humans at occurrence point as a cause.
b. For unsafe situations, there are good numbers of studies as well in identifying influencing factors globally based on meta-analysis; however, there are chances of misinterpretation in these analyses as the aim and context of the original might be varied. Besides, these studies only propose causation rather than demonstrated.
c. In the understanding of accidents, the observation of current pieces of literature in Bangladesh is often limited to deployment of unskilled labor, nonconformity, insufficiency in PPE deployment and not using PPE. Thus, the influence from other aspects of the organization is not much known and this restricts overall understanding, thus, prediction and control.
d. Human personality factors are addressed significantly in safety pieces of literature; particularly risk-taking in contributing accidents. However, a particular accident-prone personality is almost impossible to detect, besides, risk activities are subjected to sociocultural contexts. The researcher fails to find in the literature what drives an individual to risk propensity clearly in Bangladesh construction context, nor how a Bangladeshi sociocultural context direct individuals toward an unsafe situation.
e. From the Bangladesh construction aspect, the researcher, within his limitations, fails to find pieces of literature in order to know the ‘how’ aspect of qualitative

inquiries to understand the dynamics of the influencing factors for unsafe situations.

f. Besides, pieces of literature acknowledge that understanding and practice of being safe is contradicted. Earlier accident causation theories like Domino theory or Swiss model, or recently in Carayon et al. (2015) the complexity of accidents is not elaborately pictured. This leads to a lack of understanding in the application of theories that demonstrate how the interaction of personal, organizational and environmental elements influencing unsafe work situations.

Thus, there rises the necessity to conduct a study on Bangladeshi construction industry context in exploring factors influencing unsafe situations as well as the mechanism of influencing of the factors on unsafe situations.

2.18 Chapter summary

This chapter presents the current knowledge development on accidents, their causations, the complexity of accidents, the construction industry as well as individual, organizational and environmental involvement in an unsafe situation and models of causation of accidents. The chapter also presents the research framework for this study through which the research activity is structured and the outcome of the study is explained. The chapter discusses contradiction, and inadequacy in the present body of knowledge and forming stances for conducting this study. The next chapter is about the philosophical standpoint of the research, selection of research design, methods and strategies of data collection and analysis.

CHAPTER 3

METHODOLOGY

3.1 Introduction

This chapter discusses the methodological stances that this study holds to address the objective of this study. This chapter includes the selection of elements of research, population, sampling technique, data collection strategy and data analyzing the process. The importance of this chapter is in the justification and the philosophical backgrounds of the research design required for systematically planning and implementing strategies in providing meaningful answers to the research objectives.

3.2 Elements of research

Gliner, Morgan, and Leech (2017) recognizes researches as systematically acquiring new knowledge for a discipline to increase the knowledge base. In constituting the research, Leavy (2017) classifies three core elements: philosophical structure, praxis, and ethics. Alternatively, Creswell and Creswell (2018) distinguish the plans and procedures of the research as the juncture of three fundamental aspects: research philosophy, research design, and research methods.

As outlined by Creswell and Creswell (2018), this study holds research philosophy, research design and the research methods as core elements of research; the study also recognizes that these elements are greatly dependent on the research question, the issue under inquiry, the researcher himself and the audience of the study. The following sections discuss these elements adopted for this study based on the research objective and issues under study.

3.2.1 Research approaches

Creswell (2018) and Creswell and Creswell, (2018) distinguishes research approaches as plans and procedures and mention of three research approaches: quantitative, qualitative and mixed-method. These approaches are differentiated in terms of their inherited philosophical assumptions, strategies or data collection methods. Particularly, qualitative inquiries explore and understand the meaning individuals or groups attribute to a social phenomenon through non-numerical data collected from the individuals' setting.

Literatures like Hudson (2014), Hudson and Hudson (2015), Grant et al. (2018) and Grant et al. (2018a) mention that the narrow focus on both individual factors and point of occurrence in accident causation safety pieces of literature the ignore consideration of wide ranges of factors, thus, obstructs comprehensive understanding of agents in relation to accidents. In order to address this inadequacy, this study aims to explore for developing detail knowledge of the factors contributing to unsafe situations in the construction industry. As suggested by Creswell (2018) and Creswell and Creswell, (2018), due to the explorative nature, this study follows the qualitative research approach. Thus, to address the research aims this study takes into consideration a limited number of individuals' views and experiences in terms of non-numerical data rather than through statistical analysis of numeric responses. Besides, this study aims to explore what and how aspects of the factors in contribution to unsafe situations; therefore, as suggested by Silverman (2017, p.133), this study adopts qualitative approaches of researches to address the 'what' and 'how' aspects of the research aims.

3.2.2 Research philosophy

The paradigm is the philosophical orientation of social world and the nature of research integrated into a study to guide the whole research process; as of Easterby-Smith, Thorpe and Lowe (2012), Leavy (2017), Creswell (2018), the efficacy of considering philosophy in research stands in clarifying research designs. Hence, the absence of philosophy leads to significant deterioration of the quality in management researches. There are two facets of this philosophical belief system; ontology and Epistemology. Ontology concerns the orientation or attribute of reality and what can be acquired from that reality. On the other hand, epistemology, the other facade, guides the role enactment of observer and interaction of observer and the observed.

Both Leavy (2017) and Creswell and Creswell (2018) acknowledge the existence of numerous paradigms, yet, four paradigms as widely practiced: post-positivism, interpretive or constructivist, transformative and pragmatic paradigms. Among these paradigms, as of Pruzan (2016), Gliner et al. (2017), Edmonds and Kennedy (2017), Leavy (2017) and Creswell and Poth (2018), that constructivism or social constructivism is often accepted as a typical approach for qualitative inquiry. This philosophical belief system (which is often tied with interpretivism) is evolved from the social construction of reality and naturalistic inquiry that emphasizes people's subjective experiences. Knowledge is not only individually constructed but also socially mediated and shaped by constantly shifting political and social contexts.

This study explores the factors of unsafe situations for Bangladesh construction industries. Therefore, as suggested by Pruzan (2016), Gliner et al. (2017), Edmonds and Kennedy (2017), Leavy (2017) and Creswell (2018), this study holds a constructivist philosophical worldview whereby the reality is constructed through the interpretation of

individuals' experience and view on factors contributing to unsafe situation. Moreover, as outlined by Leavy (2017), ontologically this study conceives that unsafe situations for Bangladesh construction industries are complex and socially constructed fluidity of processes, experiences, practices which is in line with numerous pieces of literature including Tweedy (2014), Dekker and Pitzer (2016). From the epistemological ground, as outlined by Leavy (2017), this study focuses on perception and interpretation and considers knowledge contribution in terms of newfangled understanding of unsafe situations from individuals' experience as subjectively interpreted by the researcher himself.

3.2.3 Research design

Creswell (2018) defines research design as the procedures or strategies of inquiry within the research following any approaches that provide specific guidance for methods. Leedy and Ormrod (2016) explains fifteen research designs regardless of the research approaches; however, Gliner et al. (2017) and Bordens and Abbott (2018) broadly divide research designs into two classes: experimental designs and non-experimental designs. This study engages in exploring and understanding factors contributing to unsafe situations rather than induce experimentation. Therefore, as of Gliner et al. (2017) and Bordens and Abbott (2018), this study holds the non-experimental nature of the inquiry.

Though Patton (2015) and Merriam and Tisdell (2016) observe widely diverse qualitative research choices, Merriam and Tisdell (2016) agrees that there is no single precise mean to outline or term a qualitative study and accepts the likelihood of these designs to overlap. Merriam and Tisdell (2016) and Creswell (2018) both recognize narrative research, phenomenology, grounded theory, ethnographies, and qualitative case study as prominent qualitative research designs. Specially, Merriam and Tisdell (2016) acknowledges case study as common design of constructivist researches. This study aims

to develop a profound understanding of less understood factors contributing to an unsafe situation for the Bangladesh housing construction industry. Due to its focus in developing understanding of less understood phenomena for a context bounded by geographical location and type of industry, as of Merriam and Tisdell (2016), Leedy and Omrod (2016), Gliner et al. (2017) and Creswell and Creswell (2018), this study falls into case study design. As of Yin (2014), Saunders, Lewis, and Thornhill (2016), Edmonds and Kennedy (2017), this study is a single case study due to the number of integrated case is one.

On the other hand, Johnson and Christensen (2014), Silverman (2017), Edmonds and Kennedy (2017) and Creswell and Creswell (2018) divide case study into three distinct types: intrinsic, instrumental and collective case study. As suggested by Johnson and Christensen (2014), this study is an intrinsic case study as it explores to gain insight on a less known phenomenon through in-depth looking into a single case. Though there is some typical aspect of global construction industries are also inherited in Bangladesh construction industry, there are some unusual characteristics of Bangladesh construction industry (Section 2.10 in Chapter 2) that lead posing Bangladesh construction industry as distinct from other emerging nations. Therefore, as suggested by Besides Bryman (2012) and Yin (2014), this study is regarded as a unique case study.

3.3 Location, population, and sampling

Creswell (2018) mentions that qualitative data collection in not just limited to gathering of the data; the aspect of the data collection procedure also take account of setting the boundary of the study in terms of individuals, locations and organizations, participant number, type of information to be collected, instruments administered for collecting information, method of administering the instrument and processing of the collected information as well. Moreover, the role of the researcher in qualitative researches

includes availing access to participants, interacting with participants and most of all, concerns his values or background in interpreting participants' experience. Therefore, the following sections discuss the relevant aspects of the data collection procedure.

3.3.1 Location

The construction industry is an important contributor to Bangladesh national economy, however, remains as uncontrollably rising industry and pulled on by mostly unskilled worker; as of Ahmed et al. (2018a), this industry altogether absorbs 3.33 million of the nations' workforce for 2016 and provides 7.88% of the GDP recently. On the other hand, Rahman et al. (2015, p. 127) and Hasan et al. (2017) acknowledge that the PPE (Personal Protective Equipment) is taken as the foremost mean of risk control and the fatality counts in Bangladesh construction industry "remains a matter of serious concern". Moreover, despite challenges for a safe workplace, workplace safety earns little attention from the public or civil societal agency; thus, this sector remains unsafe and workers are left with no choice but working with risks.

Besides, in general, Hasan et al. (2017) and Rahman (2018) recognize the Bangladesh construction sector not only labor incentive or dependent on outdated technologies but also a sector where occupational safety is challenged. Referring to Safety and Rights Society survey, The Independent (2018) notes that, in the last 11 years' workplace accidents claim lives of 4,857 workers where the construction industry counts the highest number of fatalities; in 2017 alone the industry claims 144 which is 34% of the total loss. Ahmed et al. (2018c) and OSHE (2018) admit, even though the number of fatalities is not significantly changed between the period 2010-2015 in 2017 it is increased by 21.76 percent from that of 2016; moreover, no improvement is observed in managing an unsafe situation in the construction industry in a decade.

For this study, Bangladesh is selected as the location to explore the factors contributing to an unsafe situation from the previously noted fact that the volume of fatalities is heightening in recent years in Bangladeshi construction industry. Moreover, the recent studies on causation of accidents in Bangladesh construction industries are limited; Rahman et al. (2015), Islam et al. (2017) and Ahmed et al. (2018c) mostly address organizational factors like PPE allocation and applications or conformity with regulations in describing causes of accident. The collective interaction of widespread factors in larger system in emergence of unsafe situations as noted by worldwide studies like Dekker (2014), Roughton and Crutchfield (2014), Dekker (2015) and Woods et al. (2017) are absent here. Besides, the construction industry is crucial, as the industry is significant for the economy of Bangladesh, as well as it provides employment of a noteworthy volume of workers. To address the inadequacy in the understanding of the factors of an unsafe situation, this study aims Bangladesh as the location for comprehensive exploration.

3.3.2 Population

Edmonds and Kennedy (2017) and Creswell (2018) introduce the population as a group of individuals who have common characteristics. In addition, Kumar (2014) refers the population for a study as a certain group of entities from which selected few are approached to address the research questions. Moreover, to select appropriate respondents, the study requires to constitute a clearly and specifically population. However, in the qualitative inquiries that focus on exploration, the population is supposedly kept wide-ranged to provide liberty in obtaining dispersed and rich information about the situation.

Ahmed, Sultana and Faroque (2017) identifies Bangladesh housing construction sector as significant with its BDT 250 Billion investment, BDT 20 billion turnovers, BDT 2 billion revenue to the government and its workforce covers 20 percent of all 21

construction subsectors. Reza (2016), Ahmed et al. (2017) and Ahmed et al. (2018a) note, the housing construction industry employs 2.5-2.6 million of the national workforces composed in wide ranged occupations as builders, contractor, designer and engineer, subcontractor, contractor for labor, foremen and skilled and unskilled worker employed through multi-staged contracting links. Eventually, this workforce alone contributes 20% of BDT (Bangladeshi Taka) 20 Billion-worth turnover from real estate.

On the other hand, Winge and Albrechtsen (2018) find Norwegian building projects account for 41.5% of all types of accidents and one-fifth of all fall types of accidents are recorded in building types which is higher than that of refurbishment and civil engineering type of construction works. For Bangladesh, Rahman et al. (2015, p. 123) note of rigorous urbanization in the last two decades, thus, substantial growth in the housing construction industry; yet this growth in the industry "comes with a high cost for the workers" in terms of workplace safety. Besides, Islam et al. (2017) observe in 4 major cities, Bangladesh housing construction industry significantly lacks in both site protection and personnel protection.

Considering the significant volume deployment of the workforce, the contribution of turnover and yet higher magnitude of unsafe situations, the study selects a population from the housing construction industry of Bangladesh. As of the composition of the workforce in this particular industry, this study includes multi-level contractually connected builders, contractors, designers and engineers, subcontractors, labor contractors, foremen and workers with and without skills; this workforce is significant in both volume and contribution of turnover.

On the other hand, Walker (2015), Baicchi (2015) and Mishra (2017) explains, as a complex adaptive system, the overall construction industry is in interaction with analogous

enterprises, traders, clients, and complimentors. Particularly, Roughton and Crutchfield (2014), Dekker (2015), Reason (2016) and Woods et al. (2017) point, as accident emerges as a component of these collective interactions, there needs a holistic understanding of the interaction of agents to understand an accident. This study has a focus to explore factors contributing to unsafe situations; the study population signifies the individuals that are associated with the housing construction industry (as defined in Chapter 1) in Bangladesh through their involvement in construction activities as well as through direct and indirect environmental affiliation. Thus, the population includes construction workers, employees, managers, contractors that are involved in construction industries as well as external entities like the designer, customers, representatives from financial institutions, nongovernment organizations belonging to the environment of the housing industry.

3.3.3 Sample

Dul and Hak (2015) and Edmonds and Kennedy (2017) identify samples as a subset of the study population. As noted by Kumar (2014) and Creswell (2018), samples are the differentiated part of the population from whom the required information is collected. Leavy (2017) explains that in qualitative studies a depth of understanding is acquired through the meaning-making process from the subjective experience of the people belonging to the sample.

On the other hand, Kamal and Pramanik (2015) Hasan et al. (2017) notes that the capital city Dhaka is substantially affected by uprising urbanization. Particularly, Rahman et al. (2015) and Islam et al. (2017) note of the bigger extent of accidents in Dhaka city (48.91% of building construction fatalities) and point the reason as greater number of housing projects, higher volume of deployed workforce in Dhaka than other cities of Bangladesh summed together. This indicates the Dhaka housing construction industry

experiences significance in industrial growth, volume of projects, engaged workforce and extent of accidents. Therefore, this study chooses the segment of the population of the housing construction industry that is stationed in the capital city of the Dhaka housing industry. The sample includes individuals that are associated with the housing construction industry in Dhaka through direct involvement in construction activities and the housing industry's' environmental affiliation.

3.3.4 Sampling

Gliner et al. (2017) and Leavy (2017) define sampling is a process of choosing a few numbers of elements or individuals or cases from a larger volume of population. Merriam and Tisdell (2016), Leedy and Omrod (2016) classify the sampling process into two major areas: probability sampling and non-probability sampling. This study focuses on the housing construction industry in Bangladesh, in which Reza (2016) refers to an industry with a temporary that collects and deploy transient workers through informal recruitment by the labor contractors. This leaves less room to identify the involved workforces. Besides, this study aims to explore factors contributing to unsafe situations in the context of knowledgeable individuals rather than drawing inferences on the population as a generalization. Due to this explorative nature of the study, unknown volume and individually unidentifiable population, as suggested by Kumar (2014), Palinkas et al. (2015), Merriam and Tisdell (2016) and Edmonds and Kennedy (2017), this study adopts non-probability sampling, in particular, purposive sampling from the purpose of obtaining critical information from individuals considered to have significant understanding rather than their availability. As suggested by Palinkas et al. (2015) and Creswell (2017), this study follows a maximal variation sampling technique to capture the diversity of individuals' position.

3.3.5 Sample size considered for the study

The sample size is the number of respondents from whom the researcher obtains the necessary data to address the research objective. Both Kumar (2014) Fugarda and Potts (2015) explain, for qualitative studies, this number is guided by the point of data saturation, research domain, ethics, participant availability, resources allotted for the research and subjective judgments; thus, the suggested sample size for a study involving might vary from 2 to over 400. As of Tracy (2013), Patton (2015), Tolley, Ulin, Mack, Robinson and Succop (2016), Saunders, et al. (2017), Sim, Saunders, Waterfield and Kingstone (2018) and Lowe, Norris, Farris and Babbage (2018), the sample size is both emergent and flexible. However, the concept of saturation is debated, because, the key themes cannot be identified before the inquiry and it is inconsistent to determine how many individuals will provide all the unknown themes.

This study conducted interview of 15 individuals during the period February 16 to May 8, 2019, in Dhaka, Bangladesh. As hold by Saunders, et al., (2017), Sim et al. (2018) Weller, et al. (2018), this study accepts that full saturation in impractical for an explorative inquiry, therefore, the study prioritizes in probing and gaining high-level themes rather than all the possible themes existing. Moreover, as pointed by Lowe et al. (2018), the researcher ceases probing for information after 15 numbers of the interview when he perceives additional key information stops contributing much towards additional substantial themes. As suggested by Fugarda and Potts (2015) and Padgett (2017), the researcher extends the commonly practiced number for case study interview samples up until the restrictions of resources and time arise; thus, the study limits the sample count by 15.

3.4 Research instrument

Kumar (2014) defines a research instrument as any procedure for collecting information for the study. Patton (2015) and Merriam and Tisdell (2016) mention three techniques of securing qualitative data: people's experience, views, approach and insight generated from interviews, people's actions and behavior perceived from observations and lastly extracts or quotes from documents and artifacts. Among these three, interview the most effective way is obtaining information from numerous individuals representing a wide-ranging idea. As classifications, Merriam and Tisdell (2016) and Creswell and Poth (2018) mention of structured, semi-structured and unstructured, one to one and focus group interviews.

The study aims to explore what and how aspects of the factors contributing to unsafe situations in Bangladesh housing industries. Due to the explorative nature of the study, as suggested by Saunders et al. (2016) and Cohen, Manion, and Morrison (2018) the study conducted interviews by probing through multiple, complex open-ended questions to gain openness, richness, depth and authenticity in responses. In doing so, as suggested by Morris (2015), Saunders et al. (2016), Mitchell, and Jolley (2018), the study adopts unstructured in-depth interview that facilitates rich responses and insightful exploration. As suggested by Saunders et al. (2016), during the in-depth interview, the researcher probes and proceeds in a way that he believes to be best to meet those research objectives.

Besides, as suggested by Vogt et al. (2014), Saunders et al. (2016) and Gliner et al. (2017), this study chooses one to one interviews to create more privacy, to develop higher rapport between researcher and interviewee, and to gain depth and detail on specific issues. In addition, as suggested by Vogt et al. (2014) and Saunders et al. (2016), the interview is conducted face-to-face to establish personal contact with the interviewees, which is crucial

in exploring their response and meaning. The interview is taken in a single session to fit in the 30-120 minutes' period suggested for in-depth interviews by Seidman (2013) and Wilson (2019). In conducting an interview, the researcher himself follows an interview guide (Appendix. 4) consisting of leading themes to guide the probing process in the interview as suggested by Johnson and Christensen (2012) and Saunders et al. (2016).

3.5 Interview participants

Qualitative researches emphasize the emic view or participants' perception for a researcher; as of Sargeant (2012), Averill (2015), Chesnay (2015) and Merriam and Tisdell (2016), it requires participants' depth of understanding on phenomenon under observation to enrich the data. The theoretical perspective and present body of knowledge are likely to guide selecting participants in enlightening and enriching the understanding of the phenomenon. In addition, Gobo (2007, p. 405) and Palinkas et al. (2015) suggest that, in order to reach to an unblemished inference, the practical selection of potential individuals is important for the study but also establishing a link between individuals and objective of the study is vital.

This study holds that the construction industry operates as an open system; that is, this industry receives ideas, material, information, the workforce in order to complete the construction project for a customer as suggested by Walker (2015). The study also holds that, as of Górny (2017), Hoła, Sawicki and Szóstak (2018) and Jain et al. (2018), the unsafe situation at the workplace is evolved from psychological, technical, managerial and work contexts as well as environments external to the organization.

For this study, to aim the research objective, the attention in selecting participants includes housing construction industry and the entities at their periphery with direct and indirect connection with the firms' function as suggested by Tweedy (2014), Dekker

(2015), Daft (2016), Shafritz et al. (2016), Woods et al. (2017) and Jain et al. (2018). The seven types of entities for Bangladesh construction industries connected in multilevel contracting, as noted by Reza (2016) and Ahmed et al. (2017), such as builders, contractor, engineer, subcontractor, labor contractor, foremen and workers give the notion of including representatives of real estate firms, construction contractors, designing firms, trade subcontracting firms and labor contractors.

The study also includes financial institutes connected with the housing construction industry, housing clients and social organization or non-government organizations working on occupational safety, as Liu et al. (2015), Daft (2016) and Shafritz et al. (2016) emphasize on socioeconomic elements and clients with their involvement into organizational functions. Eventually, the interview is taken from one NGO working on occupational safety (at director and program officer level) in Bangladesh and one financial institute (Principal Officer level) to understand socio-economic contexts as well as client of real estate firm.

Besides, Bess and Dee (2012) mention three main hierarchical levels in functional positions within an organization: technical, managerial and institutional. At the same time, the study also intends to gain comprehensive insight through maximal variation among samples as suggested by Creswell (2017); therefore, the study considers numerous tiers within the organization in connection with construction task execution. In doing so, this study takes in owner (real estate, contractor and trade subcontractor, labor sub-contractor firms), senior management (director and general manager from designer and real estate firms), project management (project manager, project engineer and site supervisor from real estate firms) and workers (tradesmen and helper).

Strategy for locating the participant: For this study, the researcher conducts 15 interviews from 15 different loci that are internal and external to organizations. Before doing that, the researcher follows different strategies to locate organizations and individuals that the researcher considers appropriate (holding experience and knowledge in relevance with research intention as noted by Sargeant (2012) and Merriam and Tisdell (2016)). Table 3.1 depicts the strategy for participants. The real estate firms are selected from the REHAB (Real Estate and Housing Association of Bangladesh) members list availed from the official website of the organization (www.rehab-bd.org).

Table 3.1: Strategy for locating the interview participants

SL	Selections for interview	Detail	Sorted for interview	Sorting criteria
1	Housing construction Firms	Total REHAB member during study: 1048 Number of REHAB members in Dhaka City: 957	25	Availability of Firms official website for obtaining information, on existence of ongoing project and stage of the ongoing project
2	Selection of NGO operating on Occupational safety	Total Numbers of NGO recognized in working occupational safety by ILO : 2	2	
3	Selection of financial institute	Total Numbers of Financial institutes recognized by Bangladesh Bank: 59	4	Financing activities as a housing loan provider for both clients and the developers, time in business, reputation in business
4	Designer	Unknown	3	Discussion with panel of experienced civil engineers who have professional interaction with Designers, contractors, subcontractors and client
5	Contractor	Unknown	3	
6	Subcontractor	Unknown	4	
7	Client	Unknown	2	

Out of their nationwide 1048 active registered members, the research finds 957 members in Dhaka city. That list is sorted to 25 on the basis of availability of members' official website, their project location (in Dhaka city) and stage of the project (still under construction) which is relevant to the study (as of the information provided on respective firms' website).

Taking the suggestion of Palinkas et al. (2015) on identifying and selecting knowledgeable and experienced individuals, particularly on designers, construction firms, the researcher has discussion with the 6 (found through professional channels of researcher) of the IEB (Institution of Engineers, Bangladesh) members who are civil engineers by profession and having 10-20 years of experiences in real estate construction. On their review based on professional interactions with the firms and researcher's focus for the aim of the study, 3 designers' firms, 3 contractors, 4 subcontractor firms and 2 clients are sorted first; from them, after communication and discussion, one designer firm, one contractor, one trade contractor, one client and one labor subcontractor is finally taken for interview. Besides, ILO (2017) mentions two particular NGOs as a social partner for occupational health and safety for the International Labor Organization (ILO) in Bangladesh.

The researcher contacts both and confirms an interview with one at two different levels of management with the focus of labor issues and construction safety. Out of the 59 financial institutes, as noted in Bangladesh Bank (2019), the researcher primarily selects 4 due to their financing activities, length of service and reputation as a housing loan provider for both clients and the developers, and confirms one for interview.

3.6 Pilot study

Kumar (2014), Ruel, Wagner and Gillespie (2016, p.101), Saunders et al. (2016) and Brace (2018) mention of the pilot study is the integral process of an inquiry and clarifies pilot testing is a "dress rehearsal" for administering data collection procedure to evaluate the feasibility. However, for qualitative studies, Markula and Silk (2011) and Wray, Archibong, and Walton (2017) consider piloting as means to test research skills, research methods, and interview protocols; thus practical adjustments are done to prevent

apparent difficulties. Moreover, Clarke et al. (2017, p.60) suggest this "early data collection as a pilot" to compare with the intended goal to check that interpretation are aligned. And, Wray et al. (2017) also urges that researcher's lessons learned and gained experiences during a pilot study are to make available.

For this study, the researcher takes the first two interviews as a pilot interview, which is consistent with the numbers of pilot samples suggested by Clarke et al. (2017), which is 10-20% of the full-fledged sample. The researcher starts with the real estate firm for the interview process as housing construction being the core function of these firms. In terms of access and engagement with the participants, the researcher approaches with both email and telephone calls, however, the researcher has to discuss longer to get access to access into firms and personnel, that takes additional time, (similar experience is also made by Kaba and Beran (2014)).

Apart from knowledge and experience, as suggested by Palinkas et al. (2015), the researcher also includes interviewees' willingness to participate and the ability to convey experience and thoughts in expressive manners. Eventually, out of contacting 6 real estate firms' representatives, the researcher finds and finalizes two appropriate candidates (who the researchers think to serve the purpose of the study) for interviews in February 2019. Even though, the researcher initially plans to preserve all interview data through an audio recording, due to the disturbances from the ambient and privacy, takes in written notes to archive the interview content as alternative as suggested by Vogt et al. (2014) and Saunders et al. (2016). One general manager and one project engineer taken from two different real estate firms into the pilot study; they are interviewed on the previously constructed themes on the interview guide (Appendix. 4). In connection to the factors of unsafe situations, these two interviewees point on the discrepancy on the present

curriculum in the education system, deployment of a lower grade of locally made equipment, price-sensitive multilevel contracts, non-involvement of the customer, incentives for faster completion, unskilled labor and issues with the building. From the experience of the pilot study, the researcher uses a written account of the interview where recording is not possible. As the changes from the experiences of the pilot study for the full-scale study remains minor, as suggested by Clarke et al. (2017), these two interviews in pilot session are included with the other interviews conducted later and taken into analysis altogether.

3.7 Validity and reliability

Merriam and Tisdell (2016) and Edmonds and Kennedy (2017) mention that the primary aim of the research is to generate usable knowledge outcomes from the fitting application of scientific methods. In addition, Seidman (2013), Kumar (2014) and Leavy (2017) understand that the appropriateness, quality, and accuracy of the procedures adopted for data collection and drawing a conclusion over the research question are the prerequisites of establishing the research findings. Specifically, the excellence of research is evaluated in terms of consistency in the result as well as dependability in measures. Garson (2016) explains that a study is valid as long as it measures what it supposes to measure as well as there is no logical error, in conclusion, drawing from data. A measure is reliable when measuring the same phenomena at different stances or places that produces the same outcome.

Considering the traditional criteria of judging quantitative researches, literatures like Kumar (2014), Yin (2014), Tolley et al. (2016), Edmonds and Kennedy (2017) and Creswell and Creswell (2018) mention parallel constructs of qualitative inquiries: credibility (alternative criteria of internal validity), transferability (alternative criteria of

external validity/generalizability), dependability (alternative criteria of reliability) and confirm-ability (alternative criteria of objectivity).

Credibility: Edmonds and Kennedy (2017) explain credibility as the confidence in the data as well as the findings. Pieces of literature like Patton (2015) and Merriam and Tisdell (2016) and Yin (2016) mention triangulation as a mean of gaining credibility of the study. Along with several other triangulation techniques are in practice (investigator triangulation, theory triangulation, and methodological triangulation), in particular, Patton (2015) and Yin (2016) mentions of data triangulation wherein shreds of evidence of consistency are presented paralleling the perspectives of people connected differently with the area of interest. Hammond and Wellington (2013, p.145) extend the concept of triangulation as "comparing findings in one study with those in another" and "respondent validation" wherein researchers' interpretation of data is compared to that of the respondent". As suggested above, this study adopts data triangulation to establish credibility by gathering information from construction industries and organizations that is related to the safety concern of the industry. By triangulating sources qualitative data, the consistency of data availed from different interviewees is checked through side-by-side comparison. In doing so, the interpreted data is checked for consistency on theoretical ground and literature pieces of evidence (observing congruence with previous related studies). Apart from these, the researcher sends his interpretation of raw data to the participant and gets it validated by the corresponding participant.

Transferability: Merriam and Tisdell (2016) understands transferability as the extent to which the findings of one study have the ability to be applied in other circumstances. Though not all qualitative studies essentially intend to generalize the finding, Yin (2016) notes, they incline to seek transferability to other circumstances on the

ground of analytic claims. In order to gain transferability both Merriam and Tisdell (2016, p.256) and Moon et al. (2016) mention “rich, thick description” that represents an elaboration of setting, participants and the findings. Refer to the setting Merriam and Tisdell (2016) suggests providing an adequate description of the context to facilitate the audience in determining the extent of similarity to convey the findings into another context. In addition, Moon et al. (2016) note the necessity of clarifying the selection participants with research objectives. Besides, Merriam and Tisdell (2016) suggest maximum variation in the sample to expedite a wider range of possible applications. As suggested above, this study not only integrates maximum variation in samples to have rich information but also provides a detail description of participant account and context to constitute transferability for the study. Besides, as another mean of establishing transferability, the study gives rationale on engaging a particular class of interviewees and the strategies taken to locate those selected positions of participants for the study as mentioned by Moon et al. (2016).

Dependability: As of Merriam and Tisdell (2016), dependability illustrates how consistent is the result with the data; and often expressed as to how the result is obtained from the data. Moon et al. (2016) acknowledges that dependability of a study is demonstrated by the extent the study is documented to assist others to follow, audit and review the research process; thorough illustration of engaged methodology and methods employed assist audience to evaluate the level appropriateness in research practice and thus manage dependability for a study. Besides, both Hadi and Closs (2016) and Merriam and Tisdell (2016) mention maintaining an audit trail as a mean of constituting dependability.

As suggested above, this study elaborates the present concerns on the disciplines of safety, issues related to understanding accidents both overall and contextual that lead to

research aims for the study. The study also shows connections of research aims with various aspects of research methodology so that adopted strategies yield the outcome of what the study is supposed to harvest. Besides, this study gives detail stages of this research process: how data is collected, how categories are derived, and how judgments are made throughout the inquiry as an effort to develop dependability. Apart from this study presents an audit trail (exhibited in Appendix.5) to document containing logs about planning and methodological processes related to actions taken as suggested by Holloway and Galvin (2017).

Confirm-ability: Patton (2015) notes confirm-ability facilitates to constitute the fact that data and interpretations are not just fabricated in the inquirer's creative mind. Hadi and Closs (2016) understands respondent validations or member checks as scrutinizing findings and draw conclusions by the participants who generate the data and Creswell (2018) mentions this member checking as a method to ensure confirm-ability of the study. Moreover, Patton (2015) includes the audit trail as a measure of confirmability as well. This study takes in both member checking and audit trail (Appendix. 5) to constitute the accuracy of the findings. Before concluding every interview, the researcher summarizes the interviewee's view as captured by the researcher to check coherence between his interpretation and interviewee's thought as suggested by Kadushin and Kadushin (2013). Besides, in order to ensure the exactness of translated interpretation of the interviewee's views, as practiced by Yang, Xiao, and Tse (2013) and Kao and Scott (2014), the translated description of the interview is shared with the respective interviewee (who understands English). Moreover, as validation from participants, the major findings of the themes and interconnections are also conveyed to interviewees (subjected to availability of the

interviewees) to check their agreement, as suggested by Willig (2013), Hadi and Closs (2016), and Creswell and Creswell (2018).

3.8 Data collection procedure

In order to avail substantial information for addressing the research question significantly, Creswell and Poth (2018) understand the collection of data as a cyclic process that includes identifying potential individuals, gaining access, data collection and recording and data sorting. As mentioned before, this study follows a purposive sampling that focuses maximum variation in data sources; thus in judging the potential of individuals the interest of the wide range information is given priority, as suggested by Seidman (2013), rather than the accessibility to or acquaintance with the interviewee.

For this study, once the potential source of information is identified, the researcher collects the contact addresses of the organization or individuals to make contact. Once Targeted individuals or individuals in authority are contacted, as suggested by Creswell and Creswell (2018). As suggested by Kumar (2015) and Creswell and Creswell (2018), the researcher briefs on the intension and probable outcome of the study and seeks the permission of access to conduct interviews. Moreover, the participants are informed of the potential value of their participation in the study, voluntary nature of the participation, freedom to withdraw. Besides, neither participant is influenced to sign consent forms, nor they are approached with any form of incentives. Among the interviewees, two spontaneously participate in the interview, though declined signing consent form due to privacy reasons; their participation is also included for analysis as suggested by Vogt et al. (2014).

Apart from this, for this study, as suggested by Saunders et al. (2016), the interview location and time are selected considering the convenience of both the researcher and the

interviewees. As suggested by Trainor (2013, p. 131) and Saunders et al. (2016), the questions are delivered in “uncomplicated” and “universally understood” terms (using Bangla as the medium of communication) to gain detail information.

Besides, the researcher, as suggested by Saunders et al. (2016), primarily aims and records the data by an audio recorder for better understanding during analysis, the researcher faces stances where an audio recording is not possible due to inconvenience of the interviewee or disturbances in ambient. In those positions, the researcher takes a written account of the conversation during the interview as suggested by Vogt et al. (2014) and Saunders et al. (2016). Prior to the concluding of an interview, the researcher recapitulates the major contents of the session to check consistency between interviewees’ thoughts expressed and the researcher’s interpretation suggested by Kadushin and Kadushin (2013). Also, a full account of the interview is compiled that includes contextual data (time, location, interview demographic information, and organizational position). In terms of communication with the participants, though email is significantly used, however, for those participants who are found with no known email account, the options of phone call and text message or SMS (short message service) is also included for fast communication to confirm interview location and time as suggested by Kaba and Beran (2014).

3.9 The position of the researcher

Flick (2014) acknowledges that qualitative analysis is the shift from data to meaning or representation. In particular, Robson and McCartan (2016) and Gray (2018) explain, constructivism inherits interpretivist approaches where the truth and the meaning remain in the subject’s interactions with the social world where meaning is constructed by the subjects rather than been discovered. On the other hand, Trainor (2013) views the

interview as a dynamic interaction, an exchange of ideas and a co-construction of knowledge on a particular focus. In addition, Patton (2015) and Leavy (2017) acknowledge that constructivist researchers hold subjectivity in terms of experiences values, attitudes as a trail to follow deeper into the understanding of human dimensions of the world and specific phenomenon under study. In relation to that, Kumar (2014, p. 6-7) extends that subjectivity is integrated with way of thinking and is acclimatized by "educational background, discipline, philosophy, experience and skills"; subjectivity is quite different from bias where the latter is "a deliberate attempt to either conceal or highlight something".

This study explores to identify and explain the individual, organizational and environmental aspects of unsafe situations for Bangladesh construction industries. This research takes samples of interviews from the capital city of Dhaka due to its significance in a particular matter. The researcher is a Bangladeshi citizen by birth and brought up in the capital city of Dhaka; this makes the researcher familiar with the location of study as well as national culture for more than forty years. By profession, the researcher is an Engineer and has more than fifteen years of industrial experience in the same city which includes running construction projects for public and industrial facilities. The researcher is well conversant with construction people, equipment, work process and construction firms' mechanism of action. Being the mother tongue, the researcher is fluent in Bangla, which is the mode of interview. In addition, the researcher has considerable command in listening, understanding, writing and in speaking English which is his mode of education at tertiary education and post-graduation. The researcher involves his education, societal experience, work experience, familiarity with the industry, typical workforce and typical work process in constructing the theme of the questions, sampling the individuals for an interview,

gaining access to individual and site, conducting an interview and interpreting the meaning of the data. Moreover, the researcher acknowledges the line between the subjectivity and individual bias in maintaining the integrity of the study, which is discussed in Section 3.6.

3.10 Addressing the ethical obligations in the research

Social researches involve engagement with human beings in understanding human or social realities; thus, Leavy (2017) and Lessof and Sturgis (2018) acknowledge ethics as one of the principal structure in order to ensure human subjects remain harmless in the research process. The extent of relevance and usefulness of the research cannot justify any inconvenience caused to the research subject; as of Kumar (2014), Leedy and Ormrod (2016, p.120), Noain-Sánchez (2016) and Grady et al. (2017), the ethical point s that. Leedy and Ormrod (2016, p.120) mentions four categories of ethical matters that are to be addressed are the protection from harm, voluntary and informed input, privacy as personality right and integrity. However, Terry (2018) and Bordens and Abbott (2018) perceive that the concern of ethics is not limited to seeking permission for participation, clarifying the level of sensitivity of information expected and maintaining confidentiality, but also in post research stages.

In context to this study, as of Kumar (2014), Patton (2015), Merriam and Tisdell (2016), Bordens and Abbott (2018) and Terry (2018), prior to the conducting data collection, during data collection and after the data collection, the following matters are addressed to adhere ethical standards in the study,

1. Before the conduction of the study, a proposal of research (includes title, necessity, purpose, and nature of the study, potential gain from the result of the study, location, schedule, population number and instruments of data collection) involving

human as subject is prepared and submitted to ethics committee of the university. And permission for conducting research is availed (exhibited in Appendix.1).

2. Prior to the interview, the participant is briefed on the researcher, intent of research, type of information to be gathered, confidentiality on the identity, and rights of consents, voluntary participation and accessibility to the data gathered is conveyed (exhibited in Appendix. 2 and Appendix. 3)
3. During the interview, the researcher balances the value of potential responses with potential distresses of participants (such as length of time, the sensitivity of topic).
4. As reciprocity, participants are verbally and sincerely appreciated for their time, effort and contribution to the study.
5. The researcher aims to find consistent, trustworthy and substantial findings for the conclusion in finding the answers to the research question. In doing that, to the best of the knowledge, the researcher uses appropriate methodology, data collection techniques, and sample.
6. The researcher acknowledges the differences between bias and subjectivity. Thus, the researcher refrains from hiding the fact, disproportioning the fact, inappropriate use of information and unlawful sharing of information.
7. After forming the study as a report, it is checked for plagiarism
8. To the best of the knowledge of the researcher, the data is free any form of fabrication or falsification and no work of others is presented without proper citation. Moreover, in the case of publication of erroneous data, the researcher intends to correct the error through appropriate means. The declaration is attached at the beginning of this report.

9. In terms of publishing, the researcher presents the original work which is not published before and nor without acknowledging the credit of the contributing authors, this is declared at the beginning of the report as well.
10. The data is preserved for future researchers to look over for the next specified years.

3.11 The data analysis process

Miles, Huberman, and Saldaña (2014) suggests that the aim of the analysis is to present coherent, logical and credible descriptions and explanations that address all the noted gaps and discrepancies characteristically lay within individual and social life.

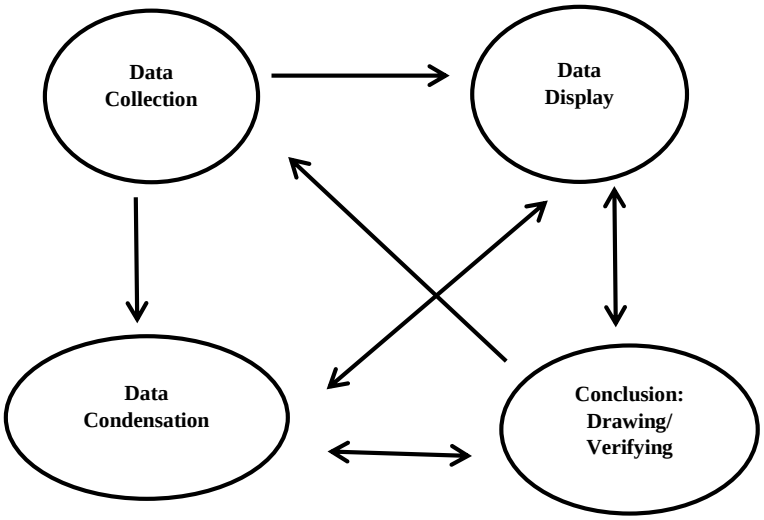


Figure 3.1: Interactive cyclic process for the data analysis (Miles et al., 2014, p. 14)

However, both Saldaña (2011) and Freeman (2017) agree on the absence of the single accurate strategy available for qualitative data analysis; what counts as finding is articulated differently depending on how the analytic questions and the strategy give formation and direction to the findings. Dey (2005), Flick (2014) and Saunders et al. (2016) note that core activity that leads qualitative researches to a conclusive outcome by data fragmenting for description and classification and making applicable connections

among them to form substantial meaning. Though Yin (2016) elaborates the analysis process in five distinct stages, Both Saldaña (2011) and Bazeley (2013, p. 223) mentions of three; description, analysis and interpretation and ‘describe’, ‘compare’, and ‘relate’ respectively as the foundation of qualitative analysis.

As Miles et al. (2014) suggests, this study takes the interactive cyclic process of data collection with 3 analytical steps in analysis: data condensation, data display, and drawing conclusion conducted concurrently and cyclically with data collection as shown in Figure 3.1. The rationale is that they facilitate well process documentation, a better understanding of ongoing analysis in reflecting and refining methods and to present more general usability as noted by Miles et al. (2014). In data condensation, the first step of data analysis, the audio data from the interview session is transformed into the text as transcripts with translation. Moreover, the transcript is reviewed to obtain a general understanding of the information delivered by informants followed by organizing the information into smaller segments by classifying sentences into categories. Later, those categories are labeled based on the original verbal expression of the informants. The coding process is applied to develop a describe context and performers and categorization for analysis in two steps. At first cycle coding, code is entitled while on the second cycle coding, the codes are grouped under a predefined smaller number of themes. On the data display stage of analysis, emerged factors and their order of influence to an unsafe situation are displayed through lines and arrows. The finding is reported in the congruence with the theoretical framework and related pieces of literature that are placed in Chapter 4.

3.12 Chapter summary

At the beginning of this chapter, it discusses briefly on the selection of elements of research, population, sampling technique, and instrument. Later data collection strategy,

the position of researcher, validity, and reliability, ethical consideration and data analyzing process are briefed. The chapter concludes with piloting interview initiatives and experience gained from it. The next chapter reports on the findings full-fledged study.

CHAPTER 4

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

To address the research questions, qualitative data is gathered from individuals involved directly or indirectly with the industry through in-depth interviews conducted face to face in sample location Dhaka. This chapter gives details of interviewees, stages of data analysis methods emerged codes under pre-structured themes, analysis, findings and discussion for every objective, theoretical interpretation of the findings and empirical supports of the findings. This chapter is important as it describes how the factors emerged as well as it discusses the findings in addressing the previously formed research questions.

4.2 Analysis strategy in this study

This study aims to explore what are the contributing factors for the unsafe situation in Bangladesh construction industry and how they contribute. Addressing the objective to explore the factors, as suggested by Bazeley (2013), Maxwell and Chmiel (2014) and Freeman (2017, p. 21), categorical thinking as adopted as research strategy as it facilitates the tactic to identify "item, trait, or action as belonging to a certain group and a way of determining the relationship groups have to one another". This study also involves exploring how the factors influence the unsafe situation at a workplace; once the data is reduced and sorted into categories, it requires connecting events into a coherent account. In necessitating a shift from identification and categorizing to connecting, as suggested by Freeman (2017), the analytic strategy moves from categorical thinking to narrative thinking to address the research objectives as it enables us to organize the elements of contiguity as a juxtaposition of time. This dynamic shift allows connecting different events

into rational accounts through witnessing interconnectedness of human interpretation of experiences explaining how factors contribute to unsafe situations for the Bangladesh housing construction industry.

4.3 Use of translation in this study

The concern for translation in qualitative studies where more than one language is involved in the research process is reflected in quite significant pieces of literature. As stated by Temple and Young (2004) and Nes et al. (2010), involving different languages in different stages of the study has consequences in understanding and interpreting the meaning transferring from participant to the audience of the research findings. Recently, there are pieces of evidence of involving professional translators in recent studies like Lohiniva, et al. (2016) (from Arabic to English), Lutz et al. (2017) (from German to English) and Prothero, et al. (2016) in (interview of non-English patients to English). However, Temple and Young (2004), Nes et al. (2010), Wong and Poon (2010), Zhu, Duncan and Tucker (2019) acknowledge the involvement of a professional translator leads the qualitative study toward triple subjectivity contributed by participants, researchers, and translators.

For this study, the context is Bangladesh construction industry, Nahar, Sulaiman, and Jaafar (2019) mentions Bangla is the official language in Bangladesh. As Olson (2016) recommends interviewing the participants in their usual language, the researcher conducts the interviews in Bangla language. As advised by Temple and Young (2004), Nes et al. (2010) and Zhu et al. (2019), for this study, the researcher does the translation from Bangla to English himself during the research process. As suggested by Zhu et al. (2019), the translation takes place in two stages of the research process in this study; first at the formation and transferring coding to themes and then at describing by interview excerpts

translated from the original language in the analysis. Moreover, in explaining the participant citation to facilitate description, the study uses translated quotations as well based on the demonstration by Lutz et al. (2017) and Zhu et al. (2019). Moreover, as stated by Yang et al. (2013) and Kao and Scott (2014), to confirm the correctness of the translated interpretation of the interviewees' meaning or views, the translated form is conveyed to interviewees who understand English.

4.4 Tools for analysis

Pieces of literature like Fielding and Lee (1998) and Spencer, Ritchie, and O'Connor (2013) and Salmona and Kaczynski (2016) acknowledge the evolution of tools like computer-assisted qualitative data analysis software is believed to offer additional flexibilities over the conventional manual process of categorizing. However, Rodik and Primorac (2015) Niedbalski and Ślęzak (2016) and Salmona and Kaczynski (2016) limit the aim of adopting software in data manageability and these tools do not automate the analysis process not it legitimizes the qualitative data more than that a manual method secures.

For this study, similar with Drisko (2013), Rodik and Primorac (2015), and Fisher (2017), the researcher holds that the computer aided analysis tools are unable to make analytic decisions, to reduce researchers' bias, and to increase and enhance reliability and credibility of the research. Besides, they are expensive to acquire, less user-friendly, and they require time and effort to be accustomed with its operation. Eventually, the cost is high when weighted to benefit ratio. Therefore, as suggested by Vogt et al. (2014), adopts spreadsheet to keep the courses of the notes and to organize coding decisions. The researcher sticks to manual clerical activities of transcribing, data importing or coding as suggested by Cope (2014), that enables him to get engaged with the richness of data.

4.5 Participant details

To address the research questions for this study, the researcher contacts the selected organization and conducts 15 one to one in-depth interviews during the period February 16 to May 8, 2019, in Dhaka. Among these, first two interviews taken in February are considered as a pilot study that is discussed in the previous chapter (section 3.5) including issues raised and strategies modified after pilot interviews. The previous chapter also notes how the researcher contacts and interviews with the interview guide and archives the interview content (section 3.7), as well as ethical consideration, is taken into an interview (section 3.9). The researcher limits the sample size in 15 and ceases interview in May 2019 (section 3.2.5).

The interviewee detail is presented in Table 4.1 where the interview duration is rounded minutes and experience of the individual in a relevant field respectively is integrated. As noted in Table 4.1, only one interviewee is female, rest 14 are male. The positions held by them are widely varied particularly within the process of construction: from general manager to trade helper. Overall, the educational qualification and experience among the interviewees are varied widely as well: educational qualifications are ranged from illiterate to postgraduate and experiences from 2.5 years to 20 years. The average length of the interviews is 51 minutes (minimum 37 and maximum 68 minutes), which falls into the approved time frame (30 minutes to 2 hours) as mentioned for an in-depth interview by Seidman (2013) and Wilson, (2019). Consideration of diverged individuals from 15 different echelons connected directly or indirectly to construction functions indicates optimizing sample variation for this study. In later sections, the interviewees are denoted in terms of their respective position in Table 4.1, which is, Interviewee 01, Interviewee 02, etc.

Table 4.1: Interview participants' detail

SL	Date	Duration (min)	Location	Position	Gender	Age (yrs)	Education	Exp. (yrs)
1	16 Feb. 2019	56	Interviewee's Office at Uttara, Dhaka, project site 1	General Manager in Real estate Firm 1	Male	45	BSc. in engineering	18
2	28 Feb. 2019	47	Public place at Badda, Dhaka	Project Engineer in Real estate firm 2	Male	35	BSc. in engineering	10
3	5 March 2019	64	Interviewee's Office at Mirpur, Dhaka	Director in NGO 1	Male	49	Post Graduate	12
4	5 March 2019	68	Interviewee's Office at Mirpur, Dhaka	Program Officer in NGO 1	Male	31	Post Graduate	2.5
5	14 March 2019	58	Interviewee's Office at Gulshan Dhaka	Director in Design Firm 1	Male	35	MSc. in engineering	10
6	14 March 2019	51	Interviewee's Office at Badda Dhaka	Project manager in Real estate firm 3	Male	37	BSc. in engineering	10
7	29 April 2019	40	Interviewee's Office at Uttara Dhaka	Senior Principal Officer in Financial firm 1	Male	48	Post Graduate	22
8	2 May 2019	37	At project site 2, Uttara	Customer of Real estate firm 4	Female	40	Post Graduate	
9	4 May 2019	39	At project site 3, Uttara	Trade Helper for Real estate firm 5	Male	19	Primary level	3
10	4 May 2019	45	At project site 4, Uttara	Owner of labor supplier firm1	Male	39	Primary level	20
11	5 May 2019	48	Interviewees Office at Baunia Dhaka	Owner of sub-contracting firm1	Male	33	Graduate	7
12	6 May 2019	46	At project site 5, Uttara	Mason for Real estate firm 6	Male	28	Illiterate	12.5
13	7 May 2019	62	At project site 6, Uttara, Dhaka	Owner of Real estate firm 7	Male	68	BSc. in engineering	13
14	7 May 2019	57	At project site 7, Uttara, Dhaka	Owner of Construction firm 1	Male	41	Post Graduate	5
15	8 May 2019	48	At project site 8, Uttara, Dhaka	Site supervisor for Real estate firm 8	Male	26	Diploma in engineering	4.5
Average duration of an interview: 51 minutes								

4.6 Sequence for data analysis

Koch, Niesz, and Wilkins (2018, p. 187) acknowledge that qualitative research findings are trailed *"*inductively using *non-mathematical analytical procedures" where words "*assign *meaning* to the phenomena under *study"*. However, Roulston (2014) holds that, though the strategies applied in interviews for qualitative studies research differ from the angle the answers to the research questions are sought. As noted before, for this study, as suggested by Miles et al. (2014) and Saunders et al. (2016), the data collection and analysis process is interactive for this study and three analytic processes (data condensation, data display, and drawing conclusion) are conducted concurrently which are described in detail in following segments.

4.6.1 Data condensation

Miles et al. (2014) and Roulston (2014) understand data condensation as the process of data reduction that involves selection, focus, simplification, abstraction and or transformation of empirical materials by summarizing, coding, theme, and category developing. However, raw data is not instantly ready for analysis; therefore, it requires processing of the interviews for transcription.

For this study, as suggested by Miles et al. (2014) and Roulston (2014), at the data reduction stage, the collected data is transcribed for each interview. Later, for the what aspect of the factors influencing unsafe situation, as suggested by Maxwell and Chmiel (2014) and Kiyimba, Lester and O'Reilly (2019), the condensed data is undergone thematic analysis as a strategy to condense and analyze data through sorting, classifying, summarizing and reconstructing to capture important concepts of the dataset through exploration of underlying pattern of meaning. On the other hand, as suggested by Frost (2019, p.85), for how an aspect of the unsafe situation, the condensed data is undergone

narrative analysis to organize the sequence of events in “temporally organized sequence”.

Transcription: Vogt et al. (2014) and Kowal and O’Connell (2014) and Kiyimba and O’Reilly (2016) refer transcription as the representation of selective aspects of the verbal expression and it enables the researcher to get familiarize with the data, thus, facilitates in preparing as well as coding and in ensuring confidentiality of data. Halcomb and Davidson (2006), King and Horrocks (2010), Nolan, Macfarlane and Cartmel (2013) and Vogt et al. (2014) note that, particularly, the word to word (verbatim) transcription works better with natural conversation than interview, verbatim is not an unavoidable necessity; besides, it is unable to capture all the data as well as time-consuming and prone to human error.

For this study, the interview is conducted in Bangla, the language spoken in the context of the study. The researcher translates the content of the interview and transcribes concurrently as suggested by Bentley and Pequegnat (2011) and Ulin et al. (2016). As suggested by Vogt et al. (2014), i*n this study,* to gain additional familiarization with the data, *t*he recorded audio data is made to a transcript by the researcher himself rather than by professional transcriptionist. Moreover, as mentioned by Vogt et a. (2014), in this study, where recording is not possible due to context or confidentiality, the transcription is made at the spot of interview, corrected and revised during interview, cross-checked with interviewee on the summary before interview is completed and prepare a detail and organized account of interview after interview is conducted.

For this study, as noted in Section 3.7, the researcher records the interview in audio-recorder and written notes (where an audio recording is not possible). From audio records, for transcription, the researcher repeatedly listens to the recorded voices and make the transcription, as suggested by Saunders et al. (2016), and reproduce in a computer-

aided word-processor account. During transcription, the researcher holds that the transcription process is selective, as mentioned by Nolan, Macfarlane, and Cartmel (2013), and aims interpretation and generation of meaning from data. Besides, for this study, as mentioned by Saunders et al. (2016), the researcher uses sampling techniques, thus, transcription is made only the segment of each audio-recording or direct interview that is relevant to the study. In doing so, complete verbatim transcription is avoided, as Halcomb and Davidson (2006), King and Horrocks (2010) and Vogt et al. (2014) point its drawback for being time-consuming and prone to human error. However, as noted by King and Horrocks (2010, p.143), the researcher takes full verbatim context for the sections that he identifies as "the main idea of interest" and captures the rest by "summarizing". Subsequently, as noted by Yang et al. (2013), Kao and Scott (2014) and Saunders et al. (2016), to ensure factual correctness a copy of the translated transcript is sent to the interviewee for scrutiny.

Thematic analysis: Both King et al. (2018) and Freeman and Sullivan (2019) hold thematic analysis as *a basic method* for *qualitative* data analysis that primarily emphasizes the identification, organization, and interpretation of themes in elaborated textual data to identify and represent core message. However, thematic analysis is not a single method, and varies how themes are defined, organized and are structured; Clarke and Braun (2018), Kiyimba et al. (2019) point, though the thematic analysis is flexible in terms of theoretical application, that is, driven by the theoretical interest of the analyst, the analysis is always underpinned by the theory.

For this study, as pointed by Clarke and Braun (2018), King et al. (2018) and Kiyimba et al. (2019), to address exploring the contributing factors of unsafe situations thematic analysis is conducted where identification, organization of data fragments are

structured on Open system theory. In this analysis, this study holds predetermined 16 themes deduced from the theory. They are industry, raw materials, human resources, financial resources, market, technology, economic conditions, government, socio-cultural and international setting as Daft (2016) observes as organizational environment; production or technical subsystem, supportive subsystem, maintenance subsystem, adaptive subsystem and managerial subsystem as Dougherty (2014) observes as organizational components. Lastly, the individuals, as stated by Bess and Dee (2012) and Walker (2015), as taken into the system, especially a complex adaptive system to execute functions in terms of roles.

For this study, in the initial stage of the thematic analysis, as suggested by Miles et al. (2014), Saldaña (2016) and McCallum-Ferguson and Forret (2018) coding is executed repeatedly in two stages. First cycle coding is done for the summarization of transcripts into data segments. During first-cycle coding, as suggested by Miles et al. (2014) and Saldaña (2016) structural coding is followed for enabling the identification of a large fragment of text as a conceptual phrase. Eventually, from the translated transcripts of 15 interviews, there are 141 codes emerged presenting the interviewees' understanding of the factors contributing to unsafe situations in the construction industry.

Later second cycle coding is executed to summarize the outcome of first cycle coding into a smaller number of sets as suggested by Miles et al. (2014), Saldaña (2016) and Polio and Friedman (2017). In doing so, pattern coding is followed for grouping the codes from first cycle codes based on shared characteristics for aligning those codes into a fewer number of categories that stand for the factors for unsafe situations for the Bangladesh housing construction industry. Eventually, the identified 141 codes gather under 16 categories in the second cycle coding. Finally, in this deductive thematic analysis

for this study, as stated by Willig (2013), Eshetu (2014) and Haslam and McGarty (2019), based on relevance these 16 categories that ate representing factors of an unsafe situation are organized under the previously determined themes of Open System Theory. Among these, the 9 environmental factors are grouped under 7 of the 10 predefined themes of technology, socio-cultural, raw material, industry, governance, market, and human resources sectors. Similarly, 4 organizational factors are organized under 4 of the 5 predefined themes of production subsystem, maintenance subsystem, managerial subsystem, and adaptive subsystem. Lastly, 3 individual factors are organized under 1 theme, which is individual. In Section 3.6, for every emerged factor, interviewee's account, emerged codes are presented with the researcher's interpretation.

Besides, in the thematic analysis process, as Saldaña (2016) points, the ranges of codes and categories are kept practical and within the suggested range: 80-300 for codes and 15–30 for categories. Moreover, this study notes also notes that the same section of transcripts falls into different categories which Shkedi (2005, p.99) explains as a part of the researcher's effort of understanding of interviewee's experience through dividing into "self-contained closed components". The detail of the thematic analysis is placed in Table 4.2 to Table 4.17.

Narrative analysis: Gabriel (2019, p.276) recognizes narratives as an important constituent of the "sense-making apparatus" for humans and organizations. Minami (2019) refers narrative as a method to summarize foregoing happenings by ordering from the verbal description to the order of events occurred. In terms of sequence, Baynham (2019) points out that narratives demonstrate the connection between objects and events as the spatial and temporal orientation of social affairs.

This study also aims to understand how the factor of environment, organization and

individual factors contribute to unsafe situations for the Bangladesh housing industry. That is, this necessitates presentation of sequence of happenings of unsafe situation in contribution of the factors under consideration; therefore, as suggested by Maxwell and Chmiel (2014) and Freeman (2017) and Minami (2019), narrative thinking is adopted to analyze the interview contents due to its ability to create meaning through making connections of sequence of events as experienced by the interviewees. In doing so, as noted by Kim (2016), storytelling in an interactional and institutional context is applied in this study to illuminate a larger society through personal stories, wherein open system theory becomes the basis of positioning the narration by the researcher. Thus, in understanding how environmental, organizational and individual factors influence unsafe situations for the Bangladesh construction industry; the narrations of the different interviewees are placed in an order so that a consistent sequence of the happening of events emerges. The study finds three courses of happening (later noted as a scenario) where environmental, organizational and individual factors become a chronological interlink with each other to lead to unsafe situations for the construction industry which is elaborated in Section 4.6.4.

4.6.2 Data Display

Miles et al. (2014) and Saunders et al. (2016) explain that data display entails organizing and integrating data into concise illustrative or visual demonstrations; though, data display enables sequencing, trustworthiness, and credibility of the data. As every study is unique, there is no particular method of data display is prescribed as appropriate; however, Miles et al. (2014) mention of two broader classes of visual presentation of data: by row and column and by the network in lines or arrow.

To exhibit differentiation in the data, to facilitate reasonable responses to the

research question and to bring together all associated and significant data, as suggested by Miles et al. (2014), this study adopts networks. Thus, through Figure 4.1 to 4.6, the analysis and the finding of the study is demonstrated in network form to portray what and how aspects of the factors contributing to unsafe situations at workplace in the Bangladesh housing construction industry.

4.7 Demonstrations of findings

Based on the review of the literature, this study finds numerous gaps and discrepancies in the present body of knowledge regarding factors contributing to an unsafe situation as noted in Chapter 1 and Chapter 2; hence, to address those areas, this study constructs four research objectives on the Bangladesh construction industry. For the same, data is gathered through in-depth interviews among 15 participants. The data is analyzed through integrating the generated codes and categories into pre-structured themes from Open System Theory as well as coherently connecting the interviewees' citations to transform into a consistent meaning of happening. The following sections from 4.6.1 to 4.6.4 elaborate the findings from the analysis in terms of codes and emerged factors and subsequent discussion on both theoretical and empirical perspectives in Section 4.7.

4.7.1 Objective 1: To explore what are the environmental factors that contribute to unsafe situations at the workplace

The first objective of the study is to explore the environmental factors that contribute to the unsafe situation for the construction industry in Bangladesh. In addressing this objective, the interviews are analyzed to explore the environmental factors influencing unsafe work situations. From the analysis of the interview, nine environmental factors have emerged that potentially influence the unsafe situations for the housing construction industry in Bangladesh as shown in Figure 4.1. The following section describes

participants' description, generation of code, formation of category and their placement under predefined themes, emergence of factors, and researcher's interpretation on the factor.

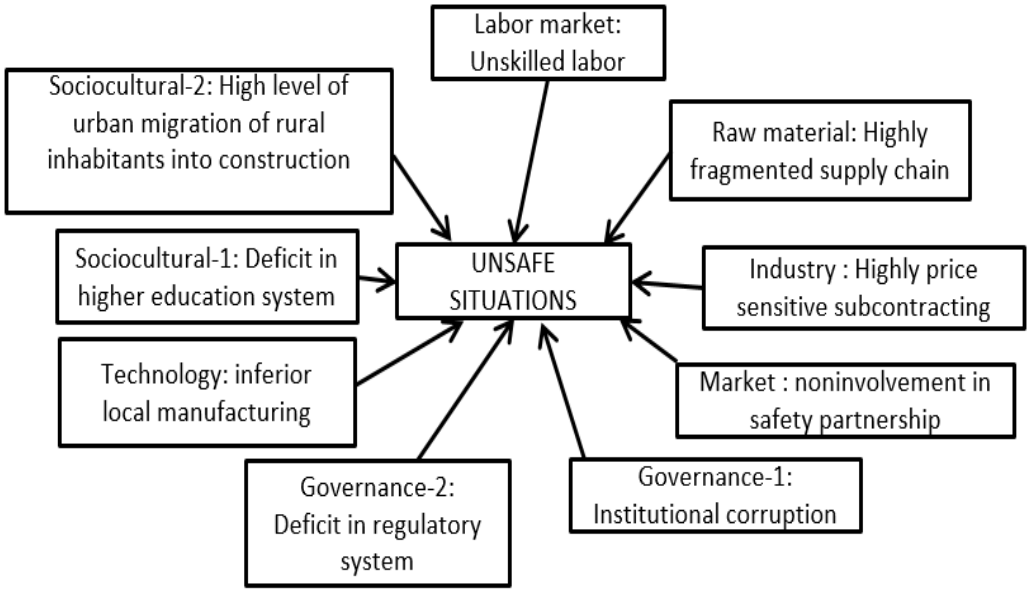


Figure 4.1: The environmental factors contributing to an unsafe situation

4.7.1.1 Emerged environmental factor 01: Inferior local manufacturing

Interviewee 04 describes that the housing construction industry sophisticated equipment is still uncommon and mostly there is cheaply and locally manufactured equipment which is risky. Interviewee 04 states,

> *"In housing companies, those have options of basements are using a backhoe and some concreting works deploy premix machines. The most common technological changes in recent years for builders are commonly winch and brick crushers. But they are cheaply locally made and sometimes become causes of accidents…still a large part of construction work is done by traditional tools like trowel and shovel or spade.*"

Similarly, Interviewee 02 notes of using poorly designed and unverified equipment that might lead to accidents. Interviewee 02 states,

"…. companies are still working with traditional and locally designed and produced equipment… while selling, though these locally made machineries declare that that particular machine has the capability of carrying particular loads these claims are not supported by any standard tests… Many accidents are associated with equipment like tower winch and roof hoist…The steel rope of those cranes is vital and there is no practice of checking or testing the wire before putting it in a project…. There is also another issue with the tower winch… there are possibilities of accidents; such as he (operator) fails to engage brake at the right time."

Interviewee 01 points of the occurrences like flipping and dropping of poorly designed roof hoist. Interviewee1 states,

"…… roof hoist is one of the riskiest equipment in our trade. It tends to overturn…. The machine may summersault when a heavy load is lifted and not counterbalanced…It is risky if not designed well, like tearing the rope."

Table 4.2: Emergence of the factor under the technology sector

Theme: Technology sector		
Interviewee	**Code**	**Category**
Interviewee 04	Application of locally made and cheaply made equipment	Inferior local manufacturing of construction equipment
	Application of these equipment causes unsafe situations	
Interviewee 02	The capability of locally made equipment is not declared upon standard testing	
	When it comes in use without prior testing tearing winch rope causes accident	
	The brake does not work sometimes	
Interviewee 01	Roof hoists use the work of tower crane, but as they are built poorly, they become risky in application	
	The crane is not counterbalanced, and it overturns	

From the account of interviewee 01, interviewee 02, and interviewee 04 are condensed into 7 codes as shown in Table 4.2; they indicate that inferior local manufacturing of construction equipment when it comes to using in construction sites, an unsafe situation arises. Both Daft (2016), Daft and Marcic (2017) and Schuerkens (2017) explain technology as the application of scientific knowledge in managing the particular situation and technological environment as scientific and technological advancements in a specific industry and society in general. In particular, Daft (2016) includes techniques of

production under the technology sector of the environment. Therefore, the emerged factor of application of locally made inferior construction equipment that is in use throughout the Bangladesh housing construction industry is placed under the theme of the technology sector.

As interpreted by the researcher in this study, the housing industry is still largely dependent on locally manufactured equipment like roof hoist. These cheaply and locally made pieces of equipment do not go through the standard design and testing process before marketing. Thus, does not give any consistent specification of working capacity. There are tearing the rope, brake failing and overturning during the application of this equipment. These issues create unsafe situations at construction sites.

4.7.1.2 Emerged environmental factor 02: deficits in the higher education system

Interviewee 02, a civil engineering graduate from one of the government engineering and technical universities, states that at his time of undergraduate civil engineering education, he does not have any course regarding occupational safety, Interviewee 02 states,

> *"...we did not find any course related to safety during our engineering study..."*

Interviewee 01, another civil engineering graduate from government engineering and technical university, points that both technical universities and general universities of Bangladesh, safety education is inadequate and it limits assess situations at work. Interviewee 01 states,

> *"We have a shortage of knowledgeable people or specialization on safety overall…Look at our education system, the engineering universities or general universities, there is no course offered focusing occupational safety and its administration as a higher degree. Not only that, 18 years ago, in my 4 years civil engineering course, I did not have any single course on occupational safety. I learned how to do work there, rather than how to do work safely, or how/why people die at work …*

…assessment of the situations…depend on personal interpretation…Engineers do that from the understanding of his work, his knowledge or expertise of his work and his experiences from similar situations."

Interviewee 05, another civil engineering graduate and a structural designer, states that occupational health and safety and project management being missing from his undergraduate curriculum obstructs to get the whole picture at work and it leaves behind chances of accidents. Interviewee 05 states,

> *"Though it is a matter of uneasiness, true, in my engineering school, we did not much of project management and none of the safety in my curriculum. In my student years, I did not have even little idea of these. In my work life, I started learning what is project deliverable, resource flow in the project life, work sequence, coordinated actions of project personnel for a steady motion of project execution and safety, but not from the housing industry, here focus is narrow.*
>
> *…Before monitoring anything, the supervisor needs to know the whole of the work. If a supervisor, who supposed to supervise the work, does not know the work in depth of what he is supervising, there are lots of chances of accidents."*

Interviewee 15, a diploma holder in civil engineering, notes that due to lack of proper knowledge and understanding it turns difficult for the supervisors to explain the unsafe situations to workers. Interviewee 15 states,

> *"There is another thing; we are unable to make them remain safe. Yes, we can only give them PPE and say this is to keep them safe. But we do not explain to them the elements of dangers in a site, how we can avoid, and why we need to remain safe because we don't have the proper knowledge. Random instruction and without the proper ground of explanation fails to penetrate their mind."*

The account of interviewee 01, interviewee 02, interviewee 5, and interviewee 15 are condensed into 9 codes as shown in Table 4.3; they specify that there is deficit in higher education system which restricts the understanding of the safety among superiors, due to this incomprehensive understanding, workers' are not made aware of unsafe situations at sites. As Fleet et al. (2014), Daft (2016) and Daft and Marcic (2017), the socio-cultural dimension of the general organizational environment are demographic characteristics, education, norms, customs, and values of the common people. In particular,

Daft (2016) includes education under the sociocultural sector of the environment. Therefore, the emerged factor of deficiency in the technical education system is taken under the theme of the sociocultural sector.

Table 4.3: Emergence of the factor under the sociocultural sector-1

Theme: Sociocultural sector		
Interviewee	**Code**	**Category**
Interviewee 02	No safety course in engineering education at the university level	Deficits in the higher education system
Interviewee 01	Shortage of safety experts and no safety course at the university	
	Engineers asses risk from their own experience	
Interviewee 05	No safety and project management course at university	
	Engineers learn of safety and management from their own experience	
	Due to less practice of safety firm do not offer much to develop insight within a supervisor who did not have institutional knowledge on safety	
	Due to incomplete understanding of the works of the work supervisor, an unsafe situation likely arises	
Interviewee 15	Lack of knowledge about safety among manager	
	Workers suffer from a lack of understanding of the situation as senior positions do not explain	

As interpreted by the researcher in this study, in Bangladeshi engineering and general higher education institutes, safety at work and managing projects are not included with the curriculum; there is shortage of people knowledgeable in safety. In an assessment of risks and managing projects, local engineers apply their knowledge, perception, and experience personally gained from working. However, due to less organizational practice of these, the developing of knowledge found in these areas is limited; thus, there is a misinterpretation or lack of understanding of a situation and eventually, risks remain at work.

4.7.1.3 Emerged environmental factor 03: Institutional corruption

Interviewee 05 gives examples of the bribe in the regulatory institutions are as big as ten times the specified government fees and these affect industries. Interviewee 05 states,

"Corruption is something that affects the industry; it is everywhere in the construction process. For approval from government offices, for a 10 Katha (about 0.15 acre) land, the government fee for design is about Tk 40000 (about USD 500) but the bribes at government officials take up to 10 times. There are demands of money from local thugs from developer otherwise there will be chaos. There are also local law enforcement people and it needs money to make them friendly."

Interviewee 13 agrees with corruption and notes that it affects other aspects like quality and safety in construction works. Interviewee 13 states,

"Quality works need resources. You need people with knowledge, good material, the right balance of time and attention. If you want to work safe, the same thing is applicable. It needs money.

For a high-rise building, there is about 10-15 government permission I need to pursue, and money is the best catalyst. If you can pour the money desk to desk the things will be smooth. In one year, you can get all the permissions. If you do not bribe, you are motionless just like a piece of rock. You need to wait for the hand of God that made the goal possible for Diego Maradona. These are all expenditures, seen or unseen and adds to project cost, the more we have non-recorded costs, the more we need to squeeze recorded cost for a balance of profit."

The account of interviewee 05 and interviewee 13 is condensed into 4 codes as shown in Table 4.4; they specify that there is a tradition of corruption in construction service providing government institutes that affect the construction industry in terms of safety at work. For an open system, Luo (2005), Fleet et al. (2014) and Daft and Marcic (2017) hold political-legal dimensions as the general organizational environment that concerns relationship between business and government in terms of regulations formulated by government addressing the business featuring the extent that government agencies can regulate and intervene industrial policies and business functions. On the other hand, Daft (2016) brings state laws, regulations, and services under governance sectors of the environment. Therefore, the emerged factor of institutional corruption in the Bangladesh housing construction industry is taken under the theme of the governance sector.

Table 4.4: Emergence of the factor under the governance sector -1

Theme: Governance sector		
Interviewee	**Code**	**Category**
Interviewee 05	Corruption in government agencies affects the industry	Institutional corruption
	Firms bribe government agencies ten times higher than the given rate of service	
Interviewee 13	Without bribing a timely gaining of approval is quite impossible	
	Builders require to squeeze budgets allotted for other functions that include safety and quality to compensate bribes	

As interpreted by the researcher in this study, the building construction process in Bangladesh involves approval from different government agencies for building construction that takes time as long as one year. A building construction permit is a prerequisite for construction; without gaining this, no project can be initiated. To avoid intentional delay, it is a common practice to pay to bribe to government agencies. However, money spends on unethical expenses as bribing reduces regular budgets for the project, which includes resources required for a safe work place.

4.7.1.4 Emerged environmental factor 04: highly fragmented supply chain

Interviewee 05 mentions about subcontracting of construction work in multi-levels. Interviewee 05 states,

> *"….These subcontractors that are involving the labour for the work…for a particular task contractors give subcontractors a rate and target, and subcontractor gives foreman a rate and target for the same work…. the volume of work that is consistent for three days by experienced worker, contractor gives two days to subcontractor….what subcontractor does is take less-skilled worker at cheaper rate and give two days' time for work..."*

Interviewee 14 particularly notes that diverting the business risk is the main reason behind subcontracting where work splits at the next level. Interviewee 14 states,

> *"When a contract is done, the work is generally given for the whole building, that includes works within our expertise and some are not. As there are so many types of works, to organize whole work, the team equipment that we need we cannot keep under the same roof in an uncertain market. So we need to look for subcontractors for works belong to other professions. The labor force that does the work manually is outsiders.*

When work comes to the main contractor, he distributes it, different subcontractors. That's not the end, that sub-contractors can split the work in terms of trade or volume of the work to another subcontractor. Say I gave subcontractor the brick and plastering work of 8 floors…..he splits the work into other sub-sub-contractors. It is not only that, he needs to hire few people to do that partial work he is doing himself, but he has profit from rest work he subcontracted, as he managed the work from a contractor. Even subcontractors do not have the full manpower to the job he took for his firm, his foreman will arrange people, and that's also external. Sometimes, there is an agreement between the sub-sub-contractor and his foreman, and the foreman takes fewer workers to finish the work in time and makes a profit for himself. Foremen also have a contractual agreement with mason or plasterer… Every quotation for the next level, the rate of volume of work gets thinner. Every level of contractor wants to scoop the profit from the part they are not even doing themselves..."

On the other hand, The Interviewee 11 notes that the downward flow of diverting risks in subcontracting. Interviewee 11 states,

"When we agree, the rate and timeframe both are challenging to us. You need to remember one thing, what contractors do not want to keep for them because it is risky, because it is challenging, they give it for subcontracting. Before we begin the work, the work is already challenging enough… in an uncertain market, it gets harder."

The account of interviewee 05, and interviewee 11 and interviewee 14 are summarized into 4 codes as shown in Table 4.5; they specify that highly fragmented supply chain in the construction industry where contracted tasks are broken down by contractors and given to subcontractors to divert risks. In the open system, as stated by Fleet et al. (2014), Daft (2016) and Daft and Marcic (2017), the suppliers, as people and organizations, provide inputs which organizations utilize and transform into organizational output, thus, organizations are dependent on suppliers for flows of personnel, resources, and information from outside, transform them and deliver outside as organizational output. In particular, Daft (2016) includes these suppliers under the raw material sector of the environment. Therefore, the emerged factor of a highly fragmented supply chain in Bangladesh housing construction industry is taken under the theme of the raw material sector.

Table 4.5: Emergence of the factor under the raw material sector

Theme: raw material sector		
Interviewee	**Code**	**Category**
Interviewee 05	Contract splits into more segment in multi-level contracting process in construction	Highly fragmented supply chain
Interviewee 14	The multilevel subcontracting is a strategy to divert risk in an unstable real estate market	
	Even though work is dissected into segments, the contract giver still holds his profit	
Interviewee 11	When workflows downward level as a segment of a contract, the work gets more challenging to execute	

The researcher interprets, as there are many types of works involved in a project, in the Bangladesh housing industry, there is the tradition of dividing the contracted works into fragments and executed by subcontractors to bypass risks. This subcontracting is done in multilevel and down to the manual worker. In the mechanism of securing a profit, the next level of the chain is given more restriction of time and a narrow budget. Eventually, levels at the bottom absorb all the risks involved in the work.

4.7.1.5 Emerged environmental factor 05: highly price sensitive labor contracting

Interviewee 02 notes that winning the tender vastly depends on price ground. Interviewee 02 states,

> *"This rate is negotiated and settled during the contract. Sometimes, the subcontractors require going through tender process …… Price is a sensitive element is tender, so for a subcontractor bidding the lowest price is advantageous…they quote the rate of particular quality of work that needs experienced workforce to a specific level…. he looks for cheaper craftsman for higher profit…so from subcontractors there are pressure to cover more works in a given day."*

Interviewee 14 notes of the race of keeping the cost low and shortening the schedule in the multi-layered subcontracting which brings danger at work. Interviewee 14 states,

> *"Sometimes, there is an agreement between the sub-sub-contractor and his foreman, and foreman takes fewer workers to finish the work in time and makes a profit for himself. Foremen also have a contractual agreement with mason or plasterer; suppose it is a 10 days' work, foreman tells if you finish it in 6 days, I will give you mojuri (daily wage) for 8 days. Both have two days of profit. So what*

happens is, every time there is an agreement with another level; people are making a profit over contract price or time. But in reality, this competition of doing fast and doing cheap brings danger."

Interviewee 15 also notes that the tendency of doing fast with fewer resources leads toward negative consequences in this price-sensitive subcontracting. Interviewee 15 states,

"Another thing is a tight target. When the labors come here, that means builders contracted, and contractor subcontracted. After coming here, there are informal contracting between sub-contractors and labor foremen, labor foremen with tradesmen. Every contract is about convincing that the contract giver gets cheaper rates of work and with the promise of faster completion. So workers take more than they can chew, do fast, try to do what they cannot do and face accidents."

From the account of interviewee 02, and interviewee 14 and interviewee 15 are summarized into 5 codes as shown in Table 4.6; they agree that price-sensitive labor contracting leads to doing tasks fast and cheaply, and the unsafe situation is likely to emerge from it. For the Open system, as stated by Fleet et al. (2014), Daft (2016) and Daft and Marcic (2017), industry setting is a dimension of the organizational task environment that refers to competitors, industry size and competitiveness and related industries. The competitor of an organization is the other organizations in participation with a particular

Table 4.6: Emergence of the factor under the industry sector

Theme: Industry sector		
Interviewee	**Code**	**Category**
Interviewee 02	Tender is own on the price quoted for unit work	Highly price sensitive labor contracting
	To gain profit from subcontracting, cheaper labor and faster completion is intended	
Interviewee 14	Forcing to work in a short time frame and fewer resources brings danger at work	
Interviewee 15	The main attention of the work lower price rate or faster completion for every tier of multi-tiered labor subcontracting	
	Doing fast and doing with less resources lead to negative consequences	

organization for the acquiring of the resources. Particularly, Daft (2016) takes competitors and competitiveness as industry sectors of the environment. Therefore, the emerged factor of price-sensitive labor subcontracting along the Bangladesh housing construction industry is taken under the theme of the industry sector.

The researcher interprets, for the Bangladesh housing industry, price is the most important determinant of winning the contract or subcontract. Not only the labor supply is outsourced, but also this subcontracted process of labor supply occurs in multiple layers, and every layer there is a struggle to reduce the price. Also, to keep the contracted work profitable, the subcontractors look for cheaper workers yet higher daily output from them to keep the labor overhead low. In the race of doing cheaply by doing fast and in fewer resources lead to unsafe situations.

4.7.1.6 Emerged environmental factor 06: high level urban migration of rural inhabitants into construction works

Interviewee 09 mentions of individuals coming to construction work from farm occupation as a better option for survival. Interviewee 09 states,

> *"I was in my village...we lost our farming land and home overnight inland erosion caused by Jamuna river…. After a few days, my uncle brought me to Dhaka… I came and joined at a site…. As a helper or worker, no experience is needed, nor any special skill; good health and capacity to tolerate physical workload is enough…The contractors would pay the only khaki, we stayed in a shed in a site, a labor camp."*

Interviewee 12 also mentions migration to urban areas for survival, and he also notes of work difference between two places. Interviewee 12 states,

> *"I came to Dhaka city for about eight years. I used to work in my village as a mason…I was planning to work overseas, in the middle east, sold land and deposited money for overseas work. But my agent cheated me. Later I left home on the shame of losing the money that I collected selling the parent's agricultural land.*
>
> *City construction is different, I have seen it, as I worked at both village and city. Village construction has little mechanization, they make brick-chips by hand, mix concrete manually, building doesn't even have concrete roofs mostly. There the*

mason work is typically making foundation and few feet wall. When people from those types of experiences come here, they feel misplaced; because, the magnitude of work is massive here. Technology is different too, bricks are lifted by a crane. It is worse for those who are new."

Interviewee 10 mentions that the unfamiliarity with the work and context leads the migrant workers to fall in danger. Interviewee 10 states,

"We do have skill issues; many workers of a site are the first time worker. They are new in work, they are new in construction, they are new in Dhaka city even. It is hard for them to remember all the dos and don'ts they hear from the first day. For that, they forget many and make mistakes or fall into accidents."

The account of interviewee 09, interviewee 10 and interviewee 12 are summarized into 8 codes as shown in Table 4.7; unskilled rural inhabitants move toward cities and join urban construction where tasks are ambient is quite different from their experience, they make mistakes and fall in danger.

Table 4.7: Emergence of the factor under the sociocultural sector-2

Theme: Sociocultural sector		
Interviewee	**Code**	**Category**
Interviewee 09	The shift from farm occupation to urban construction for earning	High level of urban migration of rural inhabitants into construction works
	Both work and accommodation are provided for migrant unskilled workers in construction sites	
Interviewee 12	Migration to urban construction for money generation	
	The unfamiliarity between rural and urban construction work process	
Interviewee 10	Many migrant workers are first time workers	
	They have unfamiliarity in construction work	
	They cannot take up all the instructions regarding tasks	
	They do mistakes along with their struggle to cope up in city work ambient	

As noted before, as stated by Poston and Bouvie (2010), Daft (2016) and Daft and Marcic (2017) sociocultural setting is a dimension of an organizational general environment that comprises of demographic characteristics, norms, customs, and values of the common people. In particular, demography focuses on the size, composition, and distribution of the human population and their changes, the component of changes, factors

affecting them and the consequence of changes. And migration is one of the three components of demographical changes. Therefore, the emerged factors of the high level of urban migration of rural inhabitants into the construction industry for Bangladesh are taken under the sociocultural sectors of the environment.

As the researcher interprets, situational necessities drive people from rural areas to urban construction sites. In the sites, there is working with no requirement for particular qualifications as well as there is an onsite accommodation opportunity for these migrants. However, urban construction tasks are quite different in terms of process and it's setting. As the workers are unfamiliar with these, they make mistakes in their tasks and fall into danger while working.

4.7.1.7 Emerged environmental factor 07: deficit in the regulatory system

Interviewee 05 highlights that the standard procedures are not detailed in designs. Interviewee 05 states,

> *"We have many laws, but less enforcement. Even BNBC shed light on many things, even in the design there are suggestions as keynotes for stating standard operating procedure but we do not practice it mostly."*

Interviewee 02 observes lacks specificity in design in particular bamboo supports in casting. Interviewee 02 states,

> *"The work of shuttering is not elaborated by the designers. The designer does not provide the array of bamboo support for the load of the roof under concreting. If the space between the vertical bamboo supports is more, the soft wet concrete of the roof might collapse before it is stabled. The work is done by site people's experience and thumb rule…"*

Interviewee 04 points out the weakness in the enforcement body in terms of manpower and appropriate inspection. Interviewee 04 states,

> *"The government body that is entitled with inspection is DIEF …But they do not have enough manpower….Sometimes the management does not allow the inspector without prior notice for inspection…..Before the inspector comes,*

everything is made ready for eyewash. In some cases, for a sudden visit, management does not allow the inspector to visit…"

Interviewee 03 points out the lack of specificity in national building code, Interview 03 states,

> *"As these general labors have no enlistment with any of the agencies, it is hard to bring them together to assist at a larger scale. In BNBC codes are mostly dealing with an engineering perspective, but the deployment of a worker, their qualifications for particular work or age are not given clearly."*

Interviewee 01 notes that both design and regulations miss elaboration of a particular situation in avoiding risks. Interviewee 01 states,

> *"…the designs do not cover any additional information how to do that, any vulnerability, any precaution or anything about that …the project engineers on their own assess the risks for particular location for particular work completion…we have regulations in terms of various codes, but they are in English…assessment of the situations of using codes are depend on the personal interpretation. The regulations do not illustrate any scenario to explain the risks and taken measures. Suppose, there are provisions of using belts for avoiding injury from falls. Even wearing belts, the position of falling might keep the body hanging in space and prevent from dropping but break the neck and cause death. Very few companies like us, use a double safety belt, we adopted it ourselves from other nations working culture.."*

The account of Interviewee 01, interviewee 02, interviewee 03, interviewee 04 and interviewee 05 are summarized into 7 codes as shown in Table 4.8; they agree that there are deficiencies in specifying building codes, non-practice of standard design procedures and deficiency in enforcement agencies. As noted before, in open systems, as stated by Luo (2005), Fleet et al. (2014) and Daft and Marcic (2017), the political-legal dimensions hold the regulatory control on industrial policies and business functions through government agencies and they fall under the government sector of the environment. Therefore, the deficit in the regulatory system for the Bangladesh housing construction industry is taken under the theme of the governance sector.

Table 4.8: Emergence of the factor under the governance sector -2

Theme: Governance sector		
Interviewee	**Code**	**Category**
Interviewee 05	Not all standard procedures are practiced in designs	Deficit in the regulatory system
Interviewee 02	Designs do not specify the bamboo array and it is done on experiences that might collapse.	
Interviewee 04	Enforcement bodies are weak in manpower and inspections are not appropriate	
Interviewee 03	Inadequate specificity in BNBC in managing technical works	
Interviewee 01	The design and regulations do not elaborate much on managing risks in a particular situation	
	Largely, the decision on necessary measures remains on an engineer's interpretation of the situation.	
	Codes written in English adds more subjectivity to this personal interpretation	

As the researcher interprets, the agencies that enforce the construction rules have their limitations of resources and capability to conduct inspection appropriately. Besides, at the construction sites, the end users experience that the existing regulations, as well as design practices, are not completely able to give a clear idea to take necessary actions for a given situation to remain safe. The codes are written in the non-native language. As a result, there are scopes of involving personal interpretation of the codes and add personal judgment to decide on a situation for assessing risks to avoid the unsafe situation.

4.7.1.8 Emerged environmental factor 08: no involvement in safety partnership from housing customers

Interviewee 01 safety measures require about 5% of overall resources invested for s project and but in a contract, it is not clear who is going to provide that. Interviewee 01 states,

> *"From the perspective of an organization, big or small, maintaining safety requires resources. Roughly, for a project of this kind, around 4-5% of the project expenditure involves equipment for maintaining a safe workplace. Though there is a provision of discussion and agreement on safe completion of work, in the contract, who is going to provide that 5% of the investment of safe work remains*

out of the discussion. In this housing business the final profit is varied 8—15%, for any part of the process chain this 5% value is really big."

Interviewee 04 notes the absence of the elements of safe work in the contract between customer and builder and it remains out of customers' consideration. Interviewee 04 states,

> *"There is no article on safety in contracts with customer.. customer cares for affordable housing in preferred places, price of the residence, timely delivery, architecture or material used or is the priority, not safe working."*

Interviewee 08 mentions that customers are not involved with any kind of safety initiatives and they are not legally bound to do that. Interviewee 08 states,

> *"During construction, I paid visits, we had a little discussion with the architects and engineers. The discussion was about interior designs, minor aesthetic modifications, that's all. No, I was not involved in any type of monitoring actions to check how the work goes on, nor I was in any type of committee. There was no discussion with us about safe working or anything…. So far I can remember, there is nothing about the safety standard or monitoring in the contract that we made with the builder."*

Interviewee 13 also agrees that the Bangladesh real estate customers are not connected to safe working initiatives at the construction sites by legally or financially. Interviewee 13 states,

> *"Quality works need resources. You need people with knowledge, good material, the right balance of time and attention. If you want to work safe, the same thing is applicable. It needs money. We have many sources of expenditures, and there is only one source of money: the customers' installment. Our customers want the cheapest possible rate per square feet. If we cannot provide, they will go somewhere else who can. Safety during construction does not give any value to our customers; thus they are not ready to pay for it. They are not attached to it: not financially, ethically, legally or emotionally…. Customers give us the minimum rate for a flat…to comply that many other things we need to overlook. There should be provisions to include the safety between customers and builders; like government and international projects in Bangladesh are doing now. If we get the rate for a higher safety at work from them, everyone can utilize that overhead: contractor, subcontractor, and labors."*

From the account of Interviewee 01, interviewee 04, interviewee 08, and interviewee 13 are summarized into 9 codes as shown in Table 4.9; they agree that there is

a lack of concern and participation from the customers in maintaining a safe workplace in construction sites. For the open system, as stated by Daft (2016) and Daft and Marcic (2017), customers, clients, possible users of products and services that an organization offers usually compose the market setting in the organizational task environment. Therefore, the emerged factor of non-involvement in safety partnerships from housing customers for Bangladesh construction industry is placed under the theme of a market sector.

Table 4.9: Emergence of the factor the under market sector

Theme: Market sector		
Interviewee	**Code**	**Category**
Interviewee 01	Maintaining safety requires resources but who is responsible for that is not made clear in practice	No involvement in safety partnership from housing customer
Interviewee 04	Customer has own priority factors of selecting real estate that does not include safety	
	No legal instruments on safety between customer and builder	
Interviewee 08	Customers are not involved in monitoring safety of under construction site	
	No contractual obligations for customers to involve in site safety	
Interviewee 13	Safe construction needs resources but safety during construction is not valued to customers	
	To comply customer's low price preference many things are skipped from the construction process	
	Customers are not legally, financially, ethically and emotionally bound to involve with site safety	
	Provision to include customer into safe construction would generate more resources to maintain a safe site	

As the researcher interprets, in executing a project with appropriate safety measures, there is a necessity of engaging resources and these resources incur a cost. Safety during construction does not give any value to the housing customers. There is also an absence of a legal instrument that imposes the integration of customers with safety working in the construction industry or sharing expenses related to making the workplace safe. The involvement from a customer, particularly in bearing safety expenses potentially

generates more resources to engage for a safe workplace, thus, reduces the challenges of unsafe situations where safety is unnoticed for financial restriction.

4.7.1.9 Emerged environmental factor 09: unskilled labor

Interviewee 06 observes a lack of education, skill, and sensibility among the labor that comes to work into construction sites. Interviewee 06 states,

> *"The workers we bring into construction work mostly come into at the site at the raw form, no prior experience, no education. Sometimes they lack sensibility; instructions are given to them, but they need to add judgment with their actions…when the labors come to know this at the site, some of them make their mind to learn more. They keep their eyes and ears open, see how the tradesman works, how he does different tasks of that trade…Like this, he gets a chance to become a tradesman in years."*

Interviewee 05 also notes the absence of skills among the labor force when they are recruited. There is also a lack of training institutes to build skilled labor for local construction industries. Interviewee 05 states,

> *"The labors are in general unskilled in our country…. who don't have any skills or education but have responsibility of feeding the family is taking entry in construction labor market... Yes, there are few governments and nongovernment institutes, like Korea Bangladesh institute or Matts are giving skill training for different construction trades, but those who get training are joining in the overseas work. Locally we do not find them working in the constructions… When a worker comes to the industry without any skill, he becomes a general worker. Then gradually, they involve in a trade as the helper of the tradesman and a full tradesman someday through experience."*

Interviewee 09 accepts that when he joins the construction industry, he is without much knowledge of the trade. He started observing others and started learning bit by bit. Interviewee 09 states,

> *"When I came here first…. I didn't know what to do and I have no one to ask or learn. No one has any time to teach, all are busy to finish target. I observed and learned bit by bit. I had no option except learning the job."*

Interviewee 12 notes that these newly recruited labors are unfamiliar with the process. Interviewee 12 states,

"When a person first comes to construction, he comes as a worker. he has no experience, no skill…They don't understand what we say, they don't see what is happening and they do understand how they need to move or act. These new entry-level workers get into trouble because of not knowing anything about big construction sites…"

From the account of interviewee 05, interviewee 06, interviewee 09, and interviewee 12 are summarized into 7 codes as shown in Table 4.10; the interviewees mention that, among the Bangladesh housing construction workers, there is a heavy density of uneducated and unskilled people. In the open system, Daft (2016) and Daft and Marcic (2017), individuals of the environment who can be taken into the organizational input for the transformation process constitute labor markets; moreover, this labor market, hiring agencies, human capital development establishments, employees in other companies and unions constitute the human resources sector. Therefore, the emerged factor of unskilled labor is placed under the theme of the human resources sector.

Table 4.10: Emergence of the factor under the human resource sector

Theme: Human resource		
Interviewee	**Code**	**Category**
Interviewee 06	Those who come as construction worker, mostly do not have of education or skill	Unskilled labor
	Observing the tradesmen for years becomes way to learn the trade	
Interviewee 05	As general workers, mostly unskilled people join in construction	
	Absence of workers in Bangladesh construction industry with skill built from local training institutes	
	Learning from on the job is the way of having skill	
Interviewee 09	The new comers learn bit by bit of the skills and trade from the tradesmen by observing.	
Interviewee 12	Ignorance of the new raw labor brings unsafe situations	

There are few institutions for building skills, yet, generally, workers join Bangladesh housing construction labor force as an unskilled general worker. These workers do not have adequate skills or education before the coming construction industry. Learning from observing the tradesmen at the site is a common option to learn for them. At

the beginning they do not know much of how to act to remain safe in the construction work processes, they fall into unsafe situations.

4.7.2 Objective 2: To explore the organizational factors that contribute to unsafe situations at workplace

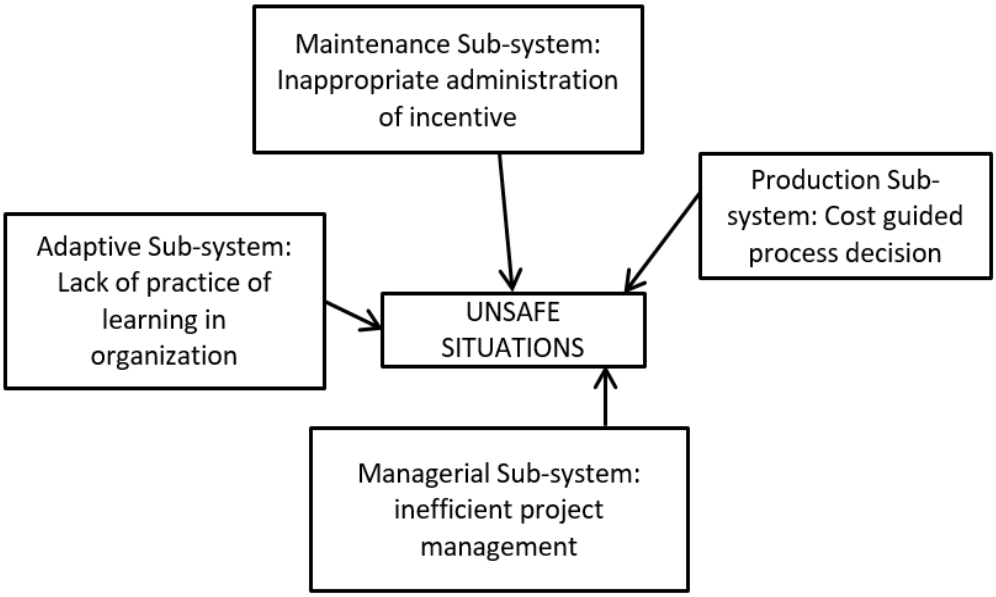


Figure 4.2: The organizational factors contributing to an unsafe situation

The second objective of this study aims to explore the organizational factors that contribute to the unsafe situation for the construction industry in Bangladesh. To address this objective, the interviews are analyzed to explore the organizational factors influencing an unsafe work situation. From the analysis of the interview, four organizational factors have emerged that potentially contribute to unsafe situations for the housing construction industry in Bangladesh as shown in Figure 4.2. The following section elaborates on the participant's account, generated code, identification of the factors through the category of the codes and researcher’s interpretation on factor.

4.7.2.1 Emerged organizational factor 01: Cost guided process decisions

Interviewee 02 describes, since the project planning stage there are managerial attempts to reduce the cost. Interviewee 02 states,

> *"We conduct a feasibility study…. side by side, predictions are made what can be the market price of the per unit area for that finished project at the given location…When a report is made on assessment…and placed before the management, the first thing they say is why this much cost and they like to put the attention where the cost can be curtailed to minimize overall project cost…In doing so, the recruitment of the appropriate manpower for the project is not done…. choice of equipment too… some company skips training…If we want to change the leaked cable, sometimes we don't get the cable replaced…. The experienced craftsman (like mason) claim higher daily wages. When contractors place the quotation, they quote the rate of a particular quality of work that needs an experienced workforce to a specific level…. when it comes to action, he looks for a cheaper craftsman for higher profit…"*

Interviewee 12 points the tendency of the contractors to acquire resources fewer that it is required for safe working in a site. Interviewee 12 states,

> *"Builders cannot escape using substandard raw material in construction, but contractors can easily pass through if he applies for less protection at work. Before there is a customer visit, we are warned to be clean and wear a gumboot or hat. But when we ask, to make scaffolding and frame with a frequent bamboo pole outside, contractors say that they cannot provide more, 'Finish the work with as much bamboo as you have now, other sites do works with fewer bamboos than this site'. If we say we need guard rail to work on the parapet wall, contractors will not listen."*

Interviewee 13 also mentions the excessive struggle to keep the cost of the project low and that ignores safety at work. Interviewee 13 states,

> *"It is true that business is competitive. Many firms are there in the market waiting for work to run their money generation. But still, taking the work that they do not know, or without having knowledge or capability brings harm. Somehow they manage work with their cheapest quotes, and sale it to a group of subcontractors, with the same degree of profit hunger like him and at the end of the day ruin the whole project due to their immaturity. Even though some safety measures need materials, a sense of safety doesn't cost. A contractor cannot change the roof hoist that he is using from the old project due to money, but he can check it if it can be used for safe operation before using it and make it useable with little investment. My point is as much as you have resources, use it for safe operation."*

From the account of Interviewee 02, interviewee 12, and interviewee 13 are summarized into 6 codes as shown in Table 4.11; the interviewees mention that, in the housing construction industry, among the contract giver and contractor workers there is a strong tendency of keeping the production cost low. For the open system organizations, as stated by Sahni and Vayunandan (2012), Bess and Dee (2012), Daniel (2010) and Dougherty (2014), the production or technical subsystem deals with the transformation process of raw material into a product. Therefore, the emerged organizational factor of cost guided process decision is taken under the theme of the production subsystem.

Table 4.11: Emergence of factor under the production subsystem

Theme: Production subsystem		
Interviewee	**Code**	**Category**
Interviewee 02	Management initiate to cut estimated cost before even the project starts.	Cost guided process decisions
	This affects involvement of appropriate manpower and technology into project	
	At the contractor level, less skilled people are deployed	
	Less allocation of resources for safety	
Interviewee 12	Contractors have the tendency to engage less resources than it is required to do task	
Interviewee 13	The effort of cost shrinking among the contractors are sometimes too high that the ignore the concern of safety of people	

As of the interpretation of the researcher, from builders to contractors there is a race of keeping the cost low. To shrink the overall cost of the contracted work, the consideration of appropriate resources, technology and manpower to complete task, and safety initiatives during task are compromised. Eventually, there is deploying of less skilled labor, engagement of equipment inappropriate conditions and lastly ignoring the concerns of safe working at sites.

4.7.2.2 Emerged organizational factor 02: Inappropriate administration of incentives

Interviewee 10 notes that production pressure supersedes concern for safety at work. Interviewee 10 states,

> *"What gives us money is dependent on the work progress we make every day. If the labor force works much in a day, the project has progressed, we can submit the bill to the subcontractor, they can pay… this goes up, from subcontractor to contractor, contractor to the owner. The works happen just here with the hands of the labor force.*
>
> *Many things can delay our work…as a project is required to be within a time limit, there is always rush at the end of the project phase. Even though bosses who talk about rules for safety, they also forget it when there is a pressure of work."*

Interviewee 12 notes that working fast regardless of safe or unsafe ultimately ensures continuity of payment for work. Interviewee 12 states,

> *"We don't have any profit if we do work safe or not. Generally, how the bosses want safety, we just comply. The same boss, today is forcing to wear gumboot, tomorrow he will tell 'I don't know how you finish, or how many dies, I want to see it finished tomorrow". Work is money if we finish work, contractors can claim the bill, and we will get paid. If we take time, every bill will be frozen."*

Interviewee 02 states that there are incentives for senior management for completing a project with more profits in less time. Interviewee 02 states,

> *"Every general manager some projects under them…. there are incentives for project success, general managers are also in a competition of completing their projects profitably…less cost or time…."*

Interviewee 09 mentions that supervisors allure labor forces to make more signs of progress by financial incentives. Interviewee 09 states,

> *"Sometimes, after a whole day of work, engineer boss told foreman to work for another few hours so that his target can be achieved, foreman convinced us by giving a whole day's wage for that 4-5 hours of work."*

Interviewee 03 also mentions of the priority of progress at work first comes to contractor and subcontractor. Interviewee 03 states,

> *"Contractors or subcontractors are always subjected to pressures to work fact for the immediate return of investment. Progress of work is the priority to contractors, not safety. So they put attention to ensure the progress of work rather*

than safety. They do not have the mindset that is congenial to safe work; not resolute like whatever my progress in work is, safety needs to come first. They would accommodate daily progress within safety."

Interviewee 11 notes that under the pressure of time, mistakes pull back the progress and that brings additional time pressure into work. That brings additional pressure for the workforce to do more again, eventually; workers push themselves to the limit and reach the point of break down. Interviewee 11 states,

"But builders and contractors can wait weeks for material, once material arrived, they do not want to delay a second. In this hurry burry there are mistakes from foremen for the wrong layout, and redoing things. For this extra delay ….they work faster. Foremen want more and more from the tradesmen… the labor collapses at some point."

The account of interviewee 02, interviewee 03, interviewee 09, and interviewee 10, interviewee 11 and interviewee 12 are summarized into 7 codes as shown in Table 4.12; the interviewees note that doing work in a shorter time is the priority in construction, and incentives are aimed at fast task completion.

Table 4.12: Emergence of the factor under the maintenance subsystem

Theme: Maintenance subsystem		
Interviewee	**Code**	**Category**
Interviewee 10	Under the work pressure the supervisors ignore the safety rules	Inappropriate administration of incentives
Interviewee 12	The perception of safe among supervisors shifts with the extent of work pressure	
Interviewee 02	Seniors managers are subjected to incentives for completing project fast	
Interviewee 09	labor supervisors attract workers to do more work in a day by promises of financial incentives.	
Interviewee 03	Among contractors and subcontractors there is priority of progress not safety	
Interviewee 11	Working under time pressure causes more mistakes and add extra time pressure	
	Under this additional time pressure, the workers collapse	

As stated by Sahni and Vayunandan (2012), Bess and Dee (2012), Daniel (2010) and Dougherty (2014, the maintenance subsystem facilitates uniting the people into their roles. Therefore, the emerged organizational factor of inappropriate administration of

incentives, that is applied to facilitate work speed in Bangladesh housing construction industries is taken under the theme of maintenance subsystem.

As the researcher interprets, time is the vital goal to achieve in the construction project. From owners to down to the bottom of the contracting chain, there is a pressure to do work fast. There are incentives for both managers and workers to expedite the speed of work; sometimes the workers are pushed beyond their capabilities. In this race with time, the element of safe working is ignored and lost from work.

4.7.2.3 Emerged organizational factor 03: Inefficient project management

Interviewee 13 mentions building projects are started with insecure funding Interviewee 13 states,

> *"..once we have a deal with few customers, we start earthwork, with their booking money. But that is just a few of the 18-20 flats of the whole project. It takes even a few more years after the completion of work to sale the last flat….I get my profit, if any, after 7-8 years from the day I started…Their booking money is almost used in the underground foundation and making water reservoirs, sewerage tanks, and grade beams. What they pay as installments helps the project grow. Meanwhile, we show the progress to other potential groups as marketing, to convince them to buy flats.. if more booked, their money becomes part of the flow of fund."*

Interviewee 14 mentions of a waiting period for sufficient money to get into the project to start work. Interviewee 14 states,

> *"Builders' money problem is common, even I have seen big builders with an irregular supply of material. If there is less money coming into the project, we need to wait for material, and for the same thing, we need to make fast to makeover the time losses when money comes. Money flow is not balanced with the plan. So, either we are waiting for material to come, or we are fighting to finish the work in time at the end hour."*

Interviewee 15 notes of the shift in project schedule and delays throughout the project. As the project proceeds, the given time to execute the plan gets more limited. Interviewee 15 states,

"In a project, we though make a progress report, we do not have an overall time frame that we can follow. Sometimes there are delays when the work starts, a shorter time frame is given than we need. That is as the project proceeds, we work with less and less time in hand. Then we aim more on finishing, we cannot involve in detail to maintain safety."

Interviewee 02 notes that the irregular cash flow shifts the schedule of the project. Interviewee 02 states,

"If a project has regular cash flow, there is even a supply of raw materials and the project goes according to the schedule. If materials are irregular, there is pressure when raw materials arrive, to counter the time waited for the material."

Interviewee 01 notes that projects are dominantly controlled by the business owners from the business perspective. Interviewee 01 states,

"Real estate deals with a bank about loans and sales of flat. But in Bangladesh, the construction gets included in the real estate business. the real estate is run mostly from a business perspective, the decision making is done based on business rather than technical. The participation of strategy making in a real estate by the technical team does not get priority, the technical team remains as neglected as the third kid of a mother goat..."

Interviewee 05 notes that the site engineers do not get supports from other related departments of the firm like supply chain and finance. Interviewee 05 states,

"...site engineer has no room for playing a managerial role. He gives only engineering expertise there because he only can do that. Even the site engineers initiate some efforts to organize material, people, quality along with project quality and time, but he has less to little control over many things. The flow of fund controls the managerial decisions and progress. As the project manager, engineers supposed to have access and receive the cooperation of linked managers of other departments too, like, supply chain, finance, and human resource or administration departments. Engineers only have pressure to finish the work in time, but they do not have supports from linked departments to be on schedule."

Interviewee 11 notes that irregular flow of material leads to pressure for quick completion of a task to compensate delay. Interviewee 11 states,

"But builders and contractors can wait weeks for material, once material arrived, they do not want to delay a second. In this hurry burry there are mistakes from foremen for the wrong layout, and redoing things. For this extra delay .... they work faster. Foremen want more and more from the tradesmen.. the labor collapses at some point."

Table 4.13: Emergence of the factor under the managerial subsystem

Theme: managerial subsystem		
Interviewee	**Code**	**Category**
Interviewee 13	Housing projects starts with tentative fund	Inefficient project management
Interviewee 14	There is fund crisis during project life is common	
	Money flow is not well adjusted with work intensity	
	Either project wait for money or doing in hurry at the end hour	
Interviewee 11	Pressure to work faster to compensate delay of material	
	This additional rush makes additional mistake	
	The pressure on the workers becomes excessive sometimes, so that they collapse	
Interviewee 15	Delay in material shrinks already tightened schedule and safe working is not maintained to meet dateline	
Interviewee 02	When material arrival is delayed, there is more time pressure to compensate delays	
Interviewee 01	Business views get more priority than professional view	
Interviewee 05	Lack of coordination among the production and auxiliary team	

From the account of interviewee 01, interviewee 02, interviewee 05, interviewee 11, interviewee 13, and interviewee 14 and interviewee 15 are summarized into 11 codes as shown in Table 4.13; the interviewees note that there are deficiencies in managing projects in terms of balanced flow of fund, material and project schedule. For the open system organizations, Sahni and Vayunandan (2012), Bess and Dee (2012), Daniel (2010) and Dougherty (2014) mention, managerial subsystem conducts the act of controlling, coordinating and directing other subsystems of the same system as well as it maintains the fitting of entire system with its environment. Therefore, the emerged organizational factor of inefficient project management, in Bangladesh housing construction projects is taken under the theme of a managerial subsystem.

As the researcher interprets, from the view of project management, Bangladeshi housing construction projects face at least planning, managing and implementing the project. The planning is done with less intelligibility on the fund flow in the project, besides, the project is managed by owners and nonprofessionally. There is also a lack of

coordination among the associated units on a project. Materials are not in time; this delay puts additional pressure on an already restricted timeframe. There are more delays for mistakes while compensating previous time losses. In this race, workers are pushed to the limit and safe working is not maintained.

4.7.2.4 Emerged organizational factor 04: lack of practice of learning in organization

Interviewee 05 mentions that, in real estate industries, the nature of work execution restricts engineering managers from developing themselves. Interviewee 05 states,

> *"In my work life, I started learning what is project deliverable, resource flow in the project life, work sequence, coordinated actions of project personnel for a steady motion of project execution and safety, but not from the housing industry, here focus is narrow…."*

Interviewee 02 mentions, due to the work pressure and absence of organizational supports, the change to get safety training from outside is limited. Interviewee 02 states,

> *"... nowadays IEB offers some short programs. Some people peruse that from personal interest, but in construction industries, during a project, it is hard to manage time. A very large group of companies invite experts and arrange in house training, few large companies inspire the employee to get trained from external organizations on company expenses and many companies skip training as a strategy of cost curtail."*

Interviewee 10 adds that there is no practice of organized safety orientation for the project team. Interviewee 10 states,

> *"We do not have time or provisions to take them together for a day and explain how we are going to do this work, what can be the danger, how to stay safe etc. if engineers warn workers one by one when they see them doing things unsafe it is not possible to deliver all the messages."*

Interviewee 15 mentions that not much information on safety is provided or shared by designers and the internal flow of trade knowledge is limited at the worker level. Interviewee 15 states,

> *"When the designer gives us the designs, it is mostly about measurements and materials. But the work process and precautions specific to that site is not shared there in detail. Site engineers and site supervisors adjust the safety*

strategies with the work and site. We haven't learned safety from any organizations formally, nor we have safety specific training. What we understand about the work, within our capability, we include safety. So there can be a gap to cover a complete perspective of safety

Time is not the only barrier; a flow of knowledge has barricades to spread. mainly the workers learn skills from ustads (tradesmen) and these tradesmen are both busy and reluctant to train up their novices, until and unless someone from the general worker proves himself extraordinary in obedience and fast working. Observing a trade only is not helpful, there are special techniques and measures too. For these things, helpers try to win the attention of the ustad so that he shares trade information and someday he can recommend him to work as a junior tradesman in this or other projects with more pay than the general helper. To earn this obedience and over-exhibit the skills he has, the general workers take reckless moves and fall into accidents..."

From the account of interviewee 02, interviewee 05, interviewee 10 and interviewee 15 are summarized into 7 codes as shown in Table 4.13; the interviewees note that there are deficiencies in terms of gaining knowledge from outside on safety or circulation of knowledge inside the construction firms. As stated by Sahni, Vayunandan (2012), Bess, Dee (2012), Daniel (2010), and Dougherty (2014), in the open system organizations, the concern of adaptive subsystems is the long-term survival in the environment.

Table 4.14: Emergence of the factor under the adaptive subsystem

Theme: adaptive subsystem		
Interviewee	**Code**	**Category**
Interviewee 05	the nature of work in real estate industries do not leave a wide window to learn for engineering managers	Lack of practice of learning in organization
Interviewee 02	Work pressure or lack of support from firms become barriers for engineers to take safety training from outside.	
Interviewee 10	Absence of safety orientation limits workers to learn on safety at site	
Interviewee 15	For technical group, learning from designer is limited as little information on safety is shared	
	Tradesmen are both busy and unenthusiastic in coaching general workers	
	A worker required to demonstrate his obedience or eagerness to tradesman to learn trade techniques	
	Workers take reckless moves sometimes to earn obedience	

As stated by Dekkar (2017) and Serrat (2017), these organizations do not only struggle to survive, they also tend to adapt themselves and evolve with the dynamic

environment through generating, transferring and influencing their intellectual possessions. Therefore, the emerged factor of lack of practice of learning in an organization is placed under the theme of an adaptive subsystem.

As the researcher interprets, in Bangladesh housing construction industry, learning cultures weak, the scopes from learning outside through training or by designers on safety is limited. There is also an absence of dissemination of safety knowledge internally through safety orientations. Transfer of trade skills from tradesmen to a general worker is limited as well, due to work pressure and unresponsiveness to coach until the worker is proven as obedient or prompt; however, in demonstrating this obedience or promptness, workers embrace risks sometimes.

4.7.3 Objective 3: To explore the individual factors that contribute to unsafe situations at workplace

The third objective of the study is to explore the individual factors that contribute to the unsafe situation for the construction industry in Bangladesh. To address this objective, the interviews are analyzed to explore the individual factors influencing an unsafe work situation. From the analysis of the interview, three individual factors, shown

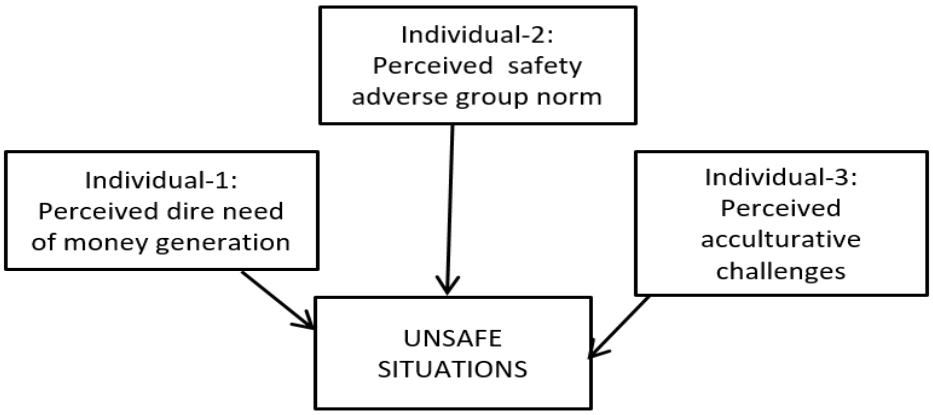


Figure 4.3: The individual factors contributing to an unsafe situation

in Figure 4.3, are emerged that potentially influence the unsafe situations for the housing construction industry in Bangladesh. The following section elaborates on the identification of the factors from interviews and explains the factors from an open system perspective and correspondence to literature.

4.7.3.1 Emerged individual factor 01: Perceived acculturative challenges

Interviewee 09 mentions that migrant workers come from a very different background and this difference baffles them. Interviewee 09 states,

> *"When I came here first, I was puzzled, so many things are different. The way people talk is different too. People do work differently from the way I have seen in my village. Works are massive. They crush bricks in the machine, mix in the machine. I have never seen them before. I was totally at a loss. I didn't know what to do and I have no one to ask or learn."*

Interviewee 11 mentions that rural workers find urban construction work practice too distant in terms of safety precautions. Interviewee 11 states,

> *"Builders or contractors, my opinion, they are conscious, they keep PPE at the site for anyone who not only works but also for who enters into sites. But workers wore mathal (straw hats) when they were farmers, they never wore helmets; same with the boots. When everyone is running fast to make up time, there is no room for trial for safety gear."*

Interviewee 12 pictures the distant urban work practices from that of the rural one. Interviewee 12 states,

> *"City construction is different, I have seen it, as I worked at both village and city. Village construction have little mechanization, they make brick-chips by hand, mix concrete manually, building don't even have concrete roofs mostly. There the mason work is typically making foundation and few feet wall. When people from those types of experiences come here, they feel misplaced; because, the magnitude of work is massive here. Technology is different too, bricks are lifted by the crane. It is worse for those who are new. They don't understand what we say, they don't see what is happening and they do not understand how they need to move or act. These new entry-level workers get into trouble because of not knowing anything about big construction sites."*

Interviewee 10 notes that there is no initiative at the sites to get familiarize the new rural migrant workers with the city construction site environment. Interviewee 12 states,

"They are new in work, they are new in construction, they are new in Dhaka city even. It is hard for them to remember all the dos and don'ts they hear from the first day. For that, they forget many and make mistakes or fall into accidents…. We do not have time or provisions to take them together for a day and explain how we are going to do this work, what can be the danger, how to stay safe etc... if engineers warn workers one by one when they see them doing things unsafe it is not possible to deliver all the messages."

From the account of interviewee 09, interviewee 10 and interviewee 11 are summarized into 6 codes as shown in Table 4.15; the interviewees note that the migrant workers perceive the wide difference in terms of work practice and safety concerns between rural work and urban construction. As stated by Bess and Dee (2012) and Bess and Dee (2012a), within the system of an individual, the information processing is constituted on both the extent of complexity of information and number of alternatives generated; moreover, the qualitative and quantitative proportions of information availability are subjected to optimization of environmental loads of information complexity. Therefore, the emerged factor of perceived acculturative challenges among the migrant housing construction workers is taken under the theme of an individual.

Table 4.15: Emergence of the factor under the individual-1

Theme: individual		
Interviewee	**Code**	**Category**
Interviewee 09	The urban work environment is perceived as overly distant to the rural migrant workers	Perceived acculturative challenges
	This difference is baffling to the worker	
Interviewee 11	Under the pressure of time, there is no scope for accommodating with safety equipment for new workers	
	The workers that are unfamiliar to the work practice act randomly and becomes unsafe at work	
Interviewee 10	There is no time or provision for briefing them for site familiarization	
	They get puzzled if they will work fast or they will work safe	

As the researcher interprets, in the Bangladesh construction industry, the workers that are coming from rural areas into the urban construction sites for work as laborers find that the work process and culture, as well as safety practices, are widely different from

their experiences. They are not only unskilled, inexperienced, or unfamiliar to the work, but also baffled by these differences. These workers do not undergo any initiatives that would make them familiar with the new work culture, due to the heavy time pressure at sites. They do not know what to do in a different culture, they act arbitrarily at sites, and unsafe situations occur.

4.7.3.2 Emerged individual factor 02: A perceived dire need for money generation

Interviewee 05 indicates that the labor force is so in need that they compromise with wellbeing with money generation. Interviewee 05 states,

> *"Those who don't have any skills or education but have the responsibility of feeding the family are taking entry in the construction labor market. It does not matter how laborious the work is, how risky it is, they would do it because it will give him a day of the wage when he returns home."*

Interviewee 10 explains that in demonstrating a skill for earning more, these workers tend to work fast and fall into unsafe situations. Interviewee 10 states,

> *"People learn a trade after they come to work in construction. The entry-level is of general worker or helper, that is, mostly manual labor of lifting and shifting. They get roughly Tk 300 -350 depending upon the position of a worksite. But a tradesman earns almost twice. As these people come to the city from the village, leave home, their target is to reach in a position to earn more soon. They observe, learn and try to replicate what they see in trade. Bit by bit they learn through trial and error. Ustads or mistri or head mistri (tradesmen) are the ones who can promote them to work. Suppose, one is doing as a helper for one or two years, a mistri can suggest foremen deploy that helper as mistri. Or if I see them doing things swiftly means he has some skills of doing, so his salary is renewed. But some of them try to be over smart and ignore safe and unsafe to impress others or gain fame. That becomes dangerous."*

Interviewee 09, under the need for money, to raise the pay, the migrant workers tend to exhibit that they can work faster for proving themselves skilled and skip safety gears for fast movement. Interviewee 09 states,

> *"What will I do with safety, safety does not bring me anything, does it give me extra money? I am fine without boot, gloves or helmet. I can maneuver fast. Doing things fast is important, being fast means I am skilled. If I am slow in doing they will think I do not have any skill. If I do things fast, and ustad is impressed in*

my skill, I can express my wish to keep me as his assistant. In a few months of doing work as an assistant, I can slowly shift my position from assistant to tradesman. No one will raise my pay, only skills will. I need to show I have skills. Only skilled people get respect here….I need to tolerate every hardship at work because I need money, for me, for my family.."

From the account of interviewee 09, interviewee 10 and interviewee 11 are summarized into 7 codes as shown in Table 4.16; the interviewees note that the unskilled workers perceive financial necessity and struggle to learn the trade skills at work from the tradesmen; to earn the tradesmen' attention, these novice workers take risky moves at work. As stated by Bess and Dee (2012), in the social systems, the system is of an individual; in the inner core of the system there is personality and the person interacts is the social environment. Human behavior is the function of interactions of an individual with his environment and his characteristics in terms of personality, individual beliefs, and need disposition. Therefore, the emerged individual factor of a perceived dire need for money generation among the general construction workers in Bangladesh housing industry is taken under the theme of the individual.

Table 4.16: Emergence of the factor under the individual-2

Theme: individuals		
Interviewee	**Code**	**Category**
Interviewee 05	The general labor force experiences strong concern of money generation.	A perceived dire need for money generation
	The need is so forceful that they even tend to tradeoff their wellbeing with earning money.	
Interviewee 10	As the tradesman earns twice, skill learning is the option to shed financial burden	
	For recognition of skills, workers tend to do their tasks fast.	
Interviewee 09	Learning a trade skill opens options of earning more	
	Moving fast at work is necessary to show familiarity with work	
	They skip safety gears to move faster at work	

As the research interprets, these workers migrate under financial obligations. This need is so strong that they sacrifice their wellbeing to earn more. As the tradesmen earn twice the general worker, these migrant general workers view that to learn the skill would

an option to shed the financial burden. They tend to demonstrate that they have skills by doing the work fast. In this course of action, they abstain from safety gear that they consider as a barrier of speed. Eventually, showing speed sometimes brings negative consequences to their safe working.

4.7.3.3 Emerged individual factor 03: perceived safety adverse group norm

Interviewee 12 notes that team perception of safety has an important role in how an individual of the team views safety at work. Interviewee 12 states,

> *"Every site has its system of doing work…What the majority of people do at site is the rule. What and how 10 other people are doing, you cannot stop following it. You cannot follow what you want to follow if 10 other people are not supporting you. Nobody bothers much unless and until there is an issue of cost or time….We don't have any profit if we do work safe or not….Work is money if we finish work, contractors can claim the bill, and we will get paid. If we take time, every bill will be frozen."*

Interviewee 09 mentions of being slow for working with precautions of an associate is discouraged by the tradesmen for making delay of the work. Interviewee 09 states,

> *"…sometimes, site boss tells us to wear a boot. They were kept at the site office. Some people would wear, rest don't. I was not used to wearing boots. It felt heavy. Some people would tease and ustad (tradesmen) told me that I am too slow in walking with mortar pan that I was shifting he needs to wait for my pan every time. If carrying mortar is not kept pace with his work of settling mortar, there will be a delay; he can't wait for my turn to pour mortar. Later I skipped, flip-flop suits better with me for my work, what will I do with safety, safety does not bring me anything, does it give me extra money? In our group, we don't use safety gear..."*

Interviewee 10 mentions that group members do not want anything that might slacken the work advancement of the group, which includes working with safety gear. Interviewee 10 states,

> *"…so becomes hard for them to work with gears that they never did, and they feel clumsy. They work in a group, and every group has a target, so, no one wants to make the group slower as being slow is losing money that can earn."*

From the account of interviewee 09, interviewee 10 and interviewee 12 are summarized into 6 codes as shown in Table 4.15; the interviewees note that workers

perceive peer pressure to prioritize work progress during work than safety. As stated by Bess and Dee (2012), the organizational membership of an individual is his participation into the system of interconnected roles and his agreement with normative prescription; however, group norms is the reflection of collective anticipations that constitutes collective individual assessments of what is appropriate individual behavior and priority. Therefore, the perceived safety adverse group norm among the workers in Bangladesh housing construction industry is taken under the theme of the individual.

Table 4.17: Emergence of the factor under the individual-3

Theme: Individual		
Interviewee	**Code**	**Category**
Interviewee 12	Team members gratifies how the whole team views safe working at site.	Perceived safety adverse group norm
	Team members are restricted to do things that might affect the priority of working fast	
	Taking time by an individual to work safe is dispirited as it delays the work progress of team	
Interviewee 09	Workers think they get slow while working in safety gears due to unfamiliarity	
	The group ignore protective equipment as they slow down	
Interviewee 10	To keep the earning secured, group members dampen acts that they think as loosening work progress; including safe working	

As the research interprets, conceiving progress is money, a strong group norm of prioritizing productivity is developed in Bangladesh housing construction industry. Therefore, anything that arises along the rapidity of work is dispirited within the workgroup. A precaution at work is conceived as time taking requires extra attention that becomes an obstacle to doing work faster. Anyone investing time to exhibit awareness is disapproved for causing a delay in meeting the group target for work.

4.7.4 Objective 4: To explore how the identified factors contribute to unsafe situations at workplace

The fourth objective of the study is to explore how the environmental, organizational and individual factors contribute to the unsafe situation for the construction industry in Bangladesh. To address this objective, the interviews are analyzed to explore how these factors contribute to an unsafe work situation. From the analysis of the interview, the mechanism of influence of the previously emerged factors is depicted in multiple scenarios as to how these factors potentially influence the unsafe situations for building construction industry in Bangladesh. The following section elaborates on how the mechanism is progressed from the interviews and explains the scenario from an open system perspective and correspondence to literature.

4.7.4.1 Scenario 1: The context and concern of organizations' cost directed production decisions

Interviewee 07, Interviewee 08 and Interviewee 13 illustrate on non-readymade residences customers' preferences flexible payments and price and builders tend to respond to those preferences. Interviewee 07 states,

> *"For housing loans, the process of loan takes in several steps in a bank. The bank has enlisted panel of lawyers…. They scrutinize the land documents from the land offices ……a land surveyor is called in, to measure the establishments if they are done according to the permitted building plans…the surveyor should confirm that all the structure columns are in place…loan is disbursed to the successful applicant...the loan processing expenditure is borne by the applicant of the loan… Once defaulted, the previously paid money is not returned and the property goes under auction."*

Interviewee 08 states,

> *"I paid a fraction of the whole value as down payment and booked it... After the down payment, we paid a particular amount every two months. I am not interested in taking a loan from the bank... At any miss of installment, the penalty is high and making me a defaulter is easy.. I was looking for real estate companies that can give me a house at my chosen location, good neighborhood, good schools*

and hospitals around, easy access to other locations, good designs with air and sunlight. But I have a budget, I know how much I can go for a flat. Of course, payment policy is the first thing, how much I need to pay for a down payment and how much is the installment.."

Interviewee 13 states,

"And once we have a deal with a few customers, we start earthwork, with their booking money. But that is just a few of the 18-20 flats of the whole project... Their booking money is almost used in the underground foundation and making water reservoirs, sewerage tanks, and grade beams. What they pay as installments helps the project grow. Meanwhile, we show the progress to another potential group as marketing, to convince them to buy flats.

For a high rise building, there are about 15-16 government permissions I need to pursue, If you don't bribe, you are motionless just like a piece of rock. …These are all expenditures, seen or unseen and adds to project cost, the more we have non-recorded costs, the more we need to squeeze recorded cost for a balance of profit. Not only that, there is pressure to handover flat in the given time.

We have many sources of expenditures, and there is only one source of money: customers' installment…. Bangladeshi real estate customers are local, they want a bit cheaper every time you tell them a price … Safety during construction does not give any value to our customers; thus they are not ready to pay for it. They are not attached to it: not financially, ethically, legally or emotionally."

Interviewee 02, interviewee 11 and Interviewee 14 mention that cost curtail tendency at construction work and lack of legal boundaries to control this effort. Interviewee 02 states,

"When a report is made on the assessment of expected cost and anticipated market value …the first thing they say is why this much cost and they like to put the attention where the cost can be curtailed….in doing so, recruitment of the appropriate manpower for the project is not done…the attempt at cost curtail affects the choice of equipment too... buy a used one and acquire old one from completed projects even though its operational lifetime is expired... There is no rule for restricting the usage of this machinery or keeping unskilled people from operating machines…many companies skip training as a strategy of cost curtail. Taking safety precautions or providing site safety is costly. When management is concerned about cost curtail, managing safety is overlooked. At the minimum, as a safety measure, PPE is provided at the office.."

Interviewee 14 states,

"When work comes to the main contractor, he distributes it, different subcontractors. That's not the end, that sub-contractor can split the work in terms of trade or volume of the work to another subcontractor…. Even subcontractors do not have the full manpower to the job he took for his firm, his foreman will arrange

people, and that's also external. Sometimes, there is an agreement between the sub-sub-contractor and his foreman, and the foreman takes fewer workers to finish the work in time and makes a profit for himself. Foremen also have a contractual agreement with mason or plasterer... So what happens is, every time there is an agreement with another level, people are making a profit over contract price or time. But in reality, this competition of doing fast and doing cheap brings danger."

Interviewee 11 states,

"Before we begin the work, the work is already challenging enough in an uncertain market it gets harder. When we make a subcontract, we need to look for a labor foreman who handles the trade we need. Those people manage mistri (tradesmen) and their helpers. But there is a tendency of the foremen, not the give required number of people at the site, sometimes, they bring more novices and less experienced. Foremen tend to finish work as fast as possible and take another site.

....when the work comes to our hand, the work is already hard to do with a relaxed budget. We need to put a boundary on how much we can invest in that. If we hire equipment, the shortest time possible. If we hire men, the shortest duration possible."

Interviewee 05, Interviewee 09, Interviewee 10 and Interviewee 15 unskilled migrant workers with unfamiliarity with urban construction yet perceive high pressure of financial necessities. Interviewee 10 states;

"Many workers of a site is the first time worker. They are new in work, they are new in construction, they are new in Dhaka city even. It is hard for them to remember all the dos and don'ts they hear from the first day. For that, they forget many and make mistakes or fall into accidents."

Interviewee 05 states,

"Yes, there are few governments and nongovernment institutes, like Korea Bangladesh institute or Matts, are giving skill training for different construction trades, but those who get training are joining in the overseas work. Locally we do not find them working in the constructions.

The labors are in general unskilled in our country. Those who don't have any skills or education but has the responsibility of feeding the family are taking entry in the construction labor market. Does not matter how laborious the work is, how risky it is, they would do it because it will give him a day of the wage when he returns home.

When a worker comes to the industry without any skill, he becomes a general worker. When they arrive at the site, everything is new to them; the equipment, work practice or rules of doing. Then gradually, they involve in a trade as a helper of the tradesman and a full tradesman someday."

Interviewee 09 states,

"If I do things fast, and ustad is impressed in my skill, I can express my wish to keep me as his assistant. In a few months of doing work as an assistant, I can slowly shift my position from assistant to tradesman. No one will raise my pay, only skills will. I need to show I have skills. ...I need to tolerate every hardship at work because I need money, for me, for my family."

Interviewee 15 states,

"Time is not the only barrier, the flow of knowledge has barricades to spread. mainly the workers learn skills from ustads(tradesmen) and these tradesmen are both busy and reluctant to train up their novices, until and unless someone from the general worker proves himself extraordinary in obedience and fast working. Observing a trade only is not helpful, there are special techniques and measures too. for these things, helpers try to win the attention of the ustad so that he shares trade information and someday he can recommend him to work as a junior tradesman in this or another project with more pay than the general helper. To earn this obedience and over-exhibit the skills he has, the general workers take reckless moves and fall into accidents."

The account of the events expressed by Interviewee 02, Interviewee 05, Interviewee 07, Interviewee 08, Interviewee 09, Interviewee 10, Interviewee 11, Interviewee 13, Interviewee 14 and Interviewee 15 are placed in a sequence to obtain the scenario involving cost directed decisions and its concern related to an unsafe situation. The scenario is portrayed in Figure 4.4 as well as described below.

The account of the events expressed by Interviewee 02, Interviewee 05, Interviewee 07, Interviewee 08, Interviewee 09, Interviewee 10, Interviewee 11, Interviewee 13, Interviewee 14 and Interviewee 15 are placed in a sequence to obtain the scenario involving cost directed decisions and its concern related to an unsafe situation. The scenario is portrayed in Figure 4.4 as well as described below,

a. Due to banks' policy for loan and interest rates, clients of the not-yet-ready flats look for non-institutional loans. Clients' priority is lower price, flexible payment system for purchase and locations mainly.

b. Builders initiate projects with funds availed from the early clients who book flats before it is ready. As not all the flats are sold before the project is completed, the

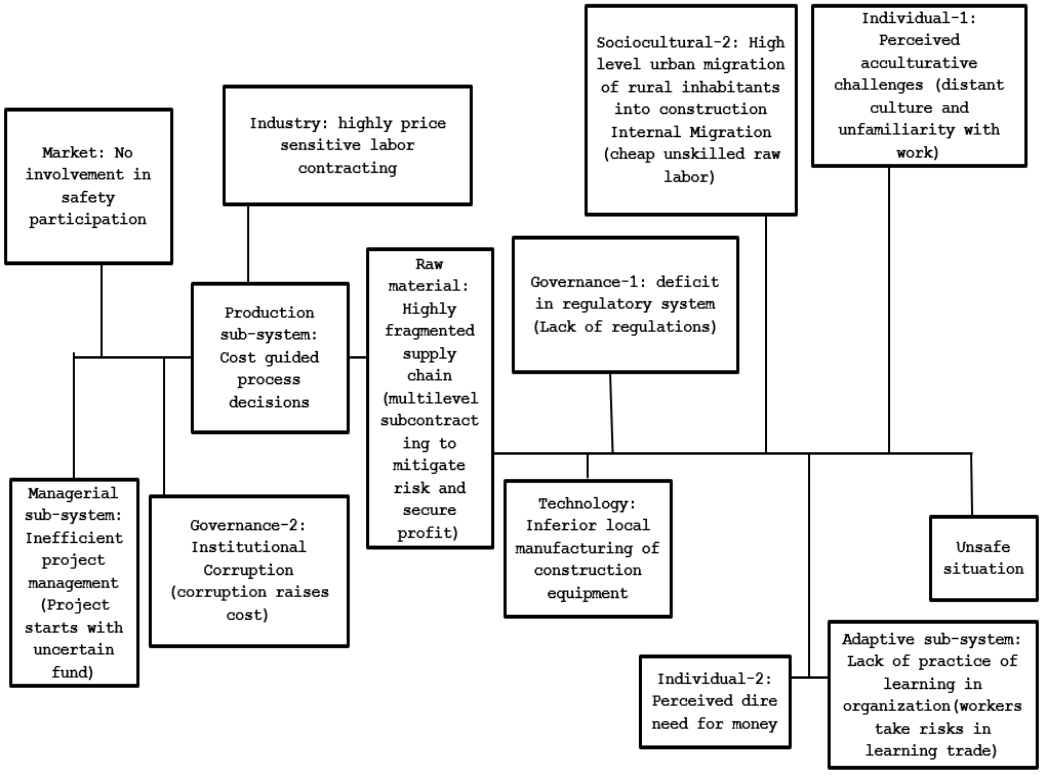


Figure 4.4: First scenario depicting how factors contribute to an unsafe situation

project continues with funds from fractionally sold project deliverables. Making workplace safe requires resources too.

c. Customers' noninvolvement in safety initiatives makes it difficult to make customers acknowledge or share safety-related expenditures. Besides, institutional corruption potentially increases cost and cause project delay.

d. The nature of construction work involves contractors and sub-contractor. The uncertainty of funds in the project affects every layer in the supply chain. Diverting risks makes this supply chain longer and opens the window more contraction of a price for the next level. Thus, cheaper less skilled workforce and work and substandard equipment are taken into a project. Demand for cheaper labor brings more rural unskilled labor force. Lack of regulations and standards allow wide

adoption of risky substandard and worn-out equipment, as well as unskilled labor. Moreover, every stage of the contract the formality of contract decreases.

e. The migrant labor force is unfamiliar with urban building construction. They come into the culturally distant background with inadequate knowledge of modern urban construction work practice with them. Moreover, acculturation stresses and lack of orientation lead to unsafe situations.

f. These labor forces do not have many chances to get their skill formally before or after joining construction site: the absence of skill providing institutes within reach reduce their likelihood of being skilled before coming and weak learning culture restricts their skill development after joining construction work. One of the few limited options for skill development is learning from tradesmen he is assisting. Unskilled labor is driven by financial liability and perceive learning skills as one of the options of shedding financial burdens. Tradesmen are not open to coaching; thus, the general workers take risks to demonstrate obedience or task rapidity to convince the tradesmen. Eventually, an unsafe situation arises.

4.7.4.2 Scenario 2: The context and the concern of inefficient project management

Interviewee 01, Interviewee 08, Interviewee 05 and Interviewee 13 illustrate on customers' flexible payment scheme with builders and builders' inefficient project decisions. Interviewee 09 states,

> *"I paid a fraction of the whole value as down payment and booked it. We settled for the payment scheme. The scheme was about five years. After the down payment, we paid a particular amount every two months…. Yes, there are a few times, I was late in paying my installment. The builder reminded me, and I negotiated with him that, as I am late for a particular installment I will pay a few of my installments early too. Then he agreed and I kept my words. I know the contractual rules are strict, still, it's a personal understanding between the builder and customer in our case."*

Interviewee 13 states,

"And once we have a deal with a few customers, we start earthwork, with their booking money. But that is just a few of the 18-20 flats of the whole project... Their booking money is almost used in the underground foundation and making water reservoirs, sewerage tanks, and grade beams. What they pay as installments helps the project grow. Meanwhile, we show the progress to another potential group as marketing, to convince them to buy flats."

Interviewee 01 states,

"In Bangladesh, the construction gets included in real estate business. the real estate is run mostly from a business perspective, the decision making is done based on business rather than technical. The participation of strategy making in a real estate by the technical team does not get priority, the technical team remains as neglected as the third kid of a mother goat.."

Interviewee 05 states,

"What happens in these construction sites, site engineer has no room for playing a managerial role. He gives only engineering expertise there because he only can do that. Even the site engineers initiate some efforts to organize material, people, quality along with project and time, but the has less to little control over many things.

The flow of fund controls the managerial decisions and progress. As the project manager, engineers supposed to have access and receive the cooperation of linked managers of other departments. Like, supply chain, finance, and human resource or administration departments. Project engineers have pressure to finish the work in time, but they do not have supports from linked departments to be on schedule."

Interviewee 01, Interviewee 02, Interviewee 05, Interviewee 09, Interviewee 11, Interviewee 12 and Interviewee 15 note of rush in tasks when fund arrives, strategies of securing profit at levels of the supply chain as well as incentives to expedite work. Interviewee 02 states,

"Every general manager has some projects under him. As there are incentives for project success, general managers are also in a competition of completing their projects profitably; less cost or time; this working fast or working cheaper also affects safety to some extent."

Interviewee 15 states,

"Another thing is a tight target. When the labors come here, that means builder contracted, and contractor subcontracted. After coming here, there are informal contracting between sub-contractors and labor foremen, labor foremen with tradesmen. Every contract is about convincing that the contract giver gets cheaper rates of work and with the promise of faster completion. So, workers take more than they can chew, do fast, try to do what they cannot do and face accidents.

Sometimes there are delays when the work starts, a shrunk time frame is given. That is as the project proceeds, we work with less and less time in hand. Then we aim more on finishing, we cannot involve in detail to maintain safety… A mason is thinking how much bricks he can put on a wall, his helper thinks how much bricks he can prepare for mason because every piece of brick they work with counts as their income. Working safely is not rewarding for them. Working more is rewarding…. So, either we are waiting for material to come, or we are fighting to finish the work in time at the end hour."

Interviewee 05 states,

"The volume of work that is consistent for three days by an experienced worker, the contractor gives two days to subcontractor, what subcontractor does is only taking less-skilled workers at the cheaper rate and give two days for work. Ultimately, the labors work an extended hour or overnight to complete work."

Interviewee 12 states,

"What the majority of people do at site is the rule. What and how 10 other people are doing, you cannot stop following it. You cannot follow what you want to follow if 10 other people are not supporting you. Nobody bothers much unless and until there is an issue of cost or time… We don't have any profit if we do work safe or not…work is money, if we finish work, contractors can claim the bill, and we will get paid. If we take time, every bill will be frozen."

Interviewee 09 states,

"Some people would wear, rest don't. I was not used to wearing boots (boots). It felt heavy. Some people would tease and ustad (tradesmen) told me that I am too slow in walking with mortar pan that I was shifting he needs to wait for my pan every time. If carrying mortar is not kept pace with his work of settling mortar, there will be a delay; he cannot wait for my turn to pour mortar. Later I skipped, flip-flop suits better with me for my work. What will I do with safety, safety does not bring me anything, does it give me extra money.."

Interviewee 11 states,

"When we agree, the rate and timeframe both are challenging to us…. what contractors do not want to keep for them because it is risky, because it is challenging, they give it for subcontracting. Before we begin the work, the work is already challenging enough in an uncertain market it gets harder.

We need to put a boundary on how much we can invest in that. If we hire equipment, the shortest time possible. If we hire men, the shortest duration possible. Because every extra day I need to pay. …builders and contractors can wait weeks for material, once material arrived, they do not want to delay a second. In this hurry burry there are mistakes from foremen for the wrong layout, and redoing things. For this extra delay after material arrival, they work faster.

Foremen want more and more from the tradesmen.. the labor collapses to some point."

The account of the event expressed by Interviewee 01, Interviewee 02, Interviewee 05, Interviewee 08, Interviewee 09, Interviewee 11, Interviewee 12, Interviewee 13 and Interviewee 15 are placed in a sequence to obtain the scenario involving the scenario of inefficient project management in firms and its concern related to unsafe situations at workplace. The scenario is portrayed in Figure 4.5 as well as described below,

a. Builders initiate and run the projects with limited funding that they acquire from selling a fraction of the projects before project completion. Even though partial, these early clients become the only fund provider throughout the project. Even, builders sometimes remain flexible to these clients' paying policy.

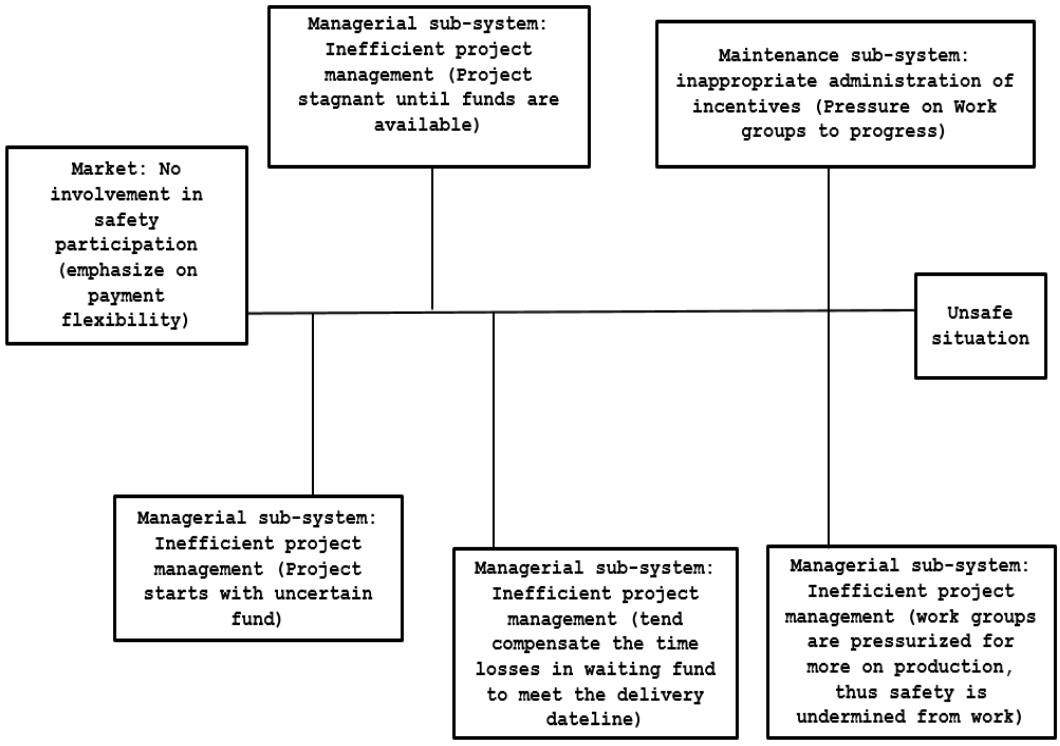


Figure 4.5: Second scenario depicting how factors contribute to unsafe situation

b. The project planning is made on uncertain and inadequate fund flow, the ideal project management practices are undermined. The project gets its motion only when the funds are enough to acquire resources.

c. As builders are contracted to handover the project in a given time. Thus, there is a rush to compensate for the resource unavailability related delays once the fund comes into the project. Every level of the supply chain requires making haste to complete in time and to secure their investments.

d. To ensure that every level is enough speed to handle the previously made delays, incentives are integrated with actions of every layer, from higher management to the labor force at lowest on the work process.

4. The behavior of the labor groups is directed by incentive, that is, aimed at faster work execution. Therefore, they discourage anything that they view to hinder their progress. Safe work requires attention at every stage of the task, and the groups view these extra measures and precautions as an impending force to safety. In the group, anything that slows down the work is discouraged, which includes working safely.

4.7.4.3 Scenario 3: Absence of effective learning throughout and its influences

Interviewee 01, Interviewee 02 and Interviewee 05 and Interviewee 15 note of the absence of learning on safety and practice of involving personal judgment in understanding situations in terms of safety in construction sites.

Interviewee 05 states,

> *"Though it is a matter of uneasiness, true, in my engineering school, we have not had much of project management and none of the safety in my curriculum... In my work life, I started learning what is project deliverable, resource flow in the project life, work sequence, coordinated actions of project personnel for a steady motion of project execution and safety, but not from the housing industry, here focus is narrow…..Not only at labors, if we see the whole*

chain, overall, but there is also a deficiency in knowledge and skill undoubtedly.. for this lack of knowledge there is lack of awareness…..”

Interviewee 02 states,

“We did not find any course related to safety during our engineering study. But nowadays IEB offers some short programs. Some people peruse that from personal interest, but in construction industries, during a project, it is hard to manage time. A very large group of companies invite experts and arrange in house training, few large companies inspire the employee to get trained from external organizations on company expenses, many companies skip training as a strategy of cost curtail.”

Interviewee 15 states,

“When the designer gives us the designs, it is mostly about measurements and materials. But the work process and precautions specific to that site is not shared there in detail. Site engineers and site supervisors adjust the safety strategies with the work and site. We haven’t learned safety from any organizations formally, nor we have safety specific training. What we understand about the work, within our capability, we include safety. So there can be a gap to cover a complete perspective of safety..”

Interviewee 01 states,

“…assessment of the situations of using codes depends on personal interpretation. The regulations do not illustrate any scenario to explain the risks and taken measures. Engineers do that from the understanding of his work, his knowledge or expertise of his work and his experiences from similar situations.”

Interviewee 09, Interviewee 10, and Interviewee 15 mention of less skill development opportunities for the workers as well. Interviewee 10 states,

“We do have skill issues, many workers of a site is the first time worker….The entry-level is the general worker or helper…But a tradesman earns almost twice. They observe, learn and try to replicate what they see in trade. Bit by bit they learn through trial and error. Ustads or mistri or head mistri (tradesmen) are the ones who can promote them to work. Suppose, one is doing as a helper for one or two, a mistri can suggest and foremen deploy that helper as mistri. Or if I see them doing things swiftly means he has some skills of doing, so his salary is renewed. But some of them try to be over smart and ignore safe and unsafe to impress others or gain fame. That becomes dangerous.”

Interviewee 09 states,

“*Doing things fast is important, being fast means I am skilled. If I am slow in doing, they will think I do not have any skill. If I do things fast, and ustad is impressed in my skill, I can express my wish to keep me as his assistant. In a few*

months of doing work as an assistant, I can slowly shift my position from assistant to tradesman."

Interviewee 15 states,

"Time is not the only barrier, the flow of knowledge has barricades to spread. mainly the workers learn skills from ustads (tradesmen) and these tradesmen are both busy and reluctant to train up their novices, until and unless someone from the general worker proves himself extraordinary in obedience and fast working. Observing a trade only is not helpful, there are special techniques and measures too. for these things, helpers try to win the attention of the ustad so that he shares trade information and someday he can recommend him to work as a junior tradesman in this or another project with more pay than the general helper. To earn this obedience and over-exhibit the skills he has, the general workers take reckless moves and fall into accidents."

The account of the event expressed by Interviewee 01, Interviewee 02 and Interviewee 05, Interviewee 09, Interviewee 10, and Interviewee 15 are placed in a sequence to obtain the scenario involving the scenario related to the absence of effective learning in levels within firms and its influence on unsafe situations at the workplace is obtained. The scenario is portrayed in Figure 4.6 as well as described below,

1. The technical education system does not address safety in the curriculum. The understanding associated with risk for particular work contexts is backed by a base of knowledge, perception, experience, and practice. Any inadequacy in building a safety perspective leaves risks misunderstood, unnoticed and eventually unaddressed.
2. Misinterpretation of context and misunderstanding of taking fitting precautions are likely to be developed from ambiguity or incompleteness of regulations as well.
3. Due to the priority of work and cost control, new knowledge is acquired frequently from neither outside nor existing information flow inside the organization freely. Thus, there are constricted information flows from designers to engineers and downward.

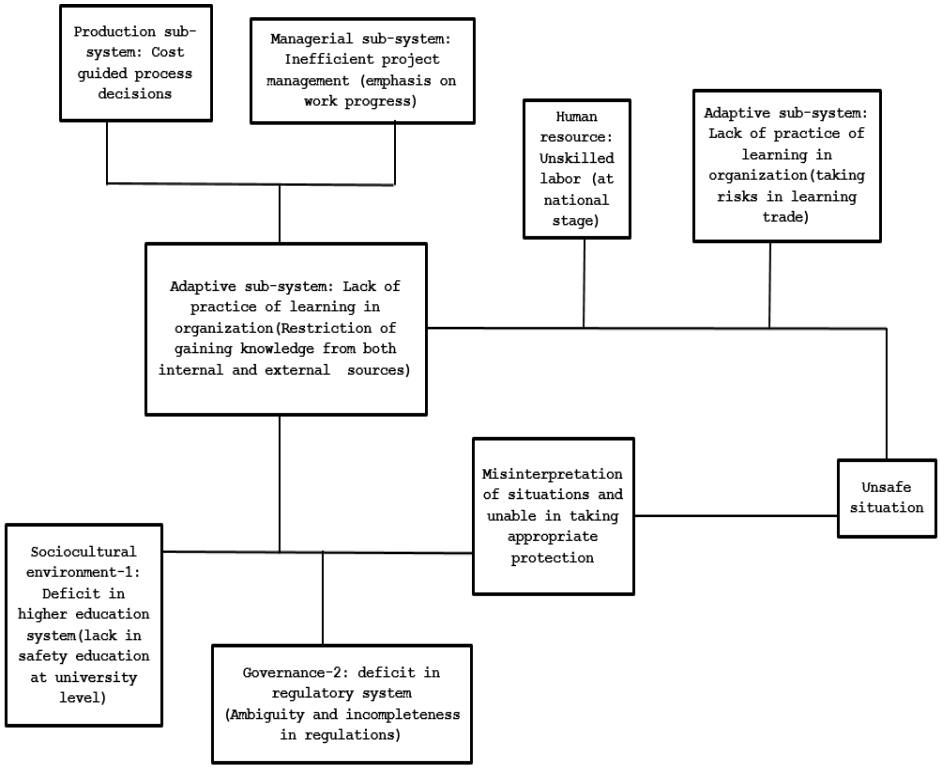


Figure 4.6: Third scenario depicting how factors contribute to unsafe situation

4. There is a weak infrastructure for trade skill development that restricts a worker from gaining skills formally. Generally, for a worker, skill is gained in work by observing the senior tradesmen and learning. For working with tradesmen, a newly entered unskilled worker requires to demonstrate himself as quick and courageous. To catch tradesmen's attention, a general worker get involves exhibiting risky behavior.

4.8 Discussion on findings

Coffman (2011) and Dekker (2014) note that the quest for the causal foundation of empirical reality aims further predictability and control of events; however, because of uncountable nonlinear interactions formed in combined networks for a complex system, it is almost impossible to predict and control through linear chains of cause and effect

relationship. The notion of outlining an unsafe situation in simplified linear single direct cause or probability and percentile of errors, eventually, end up at aiming humans at the front as a necessary cause through a feeble link. The literature review has identified the necessity of further attention on several discrepancies and unsolved issues existing in present pieces of literature on both theoretical standpoint and empirical foundations on the understanding of the causation of accidents.

The construction industry is crucial in the economy at the same time accounts for frequent accidents and losses. This research has attempted to add additional clarity in understanding of an accident-prone context in an emerging country like Bangladesh. This study identifies various influencing factors within and beyond the organization from the perspectives of individuals directly or indirectly connected with industry as a member of the firm, contractors or building construction industry environment in Bangladesh; the study also explains how these influencing factors operate in a bigger context and converge to an unsafe situation for frontline workers. The discussion of the findings proceeds by the sequence of research objectives of the study and presented from Section 4.7.1.1 to 4.7.3.3.

4.8.1 Discussion on Objective 1: To explore what are the environmental factors that contribute to unsafe situations at the workplace

In exploring environmental factors contributing to unsafe situations in Bangladesh housing construction industry, 8 factors come out as the finding. The finding indicates, environment external to environment potentially influences the conditioning of unsafe situations. One by one, the discussion of the 9 factors is presented in Section 4.7.1.1 to 4.7.1.9 that includes both explanation under Open System Theory as well as in correspondence to literature and Section 4.7.1.10 presents a general discussion on this first objective of the study.

4.8.1.1 Emerged environmental factor 01: Inferior local manufacturing

In an open system, the technology exists in general environment and it tangentially influence on the regular operation of the organization; both Marion (1999, p. 64-65) and Daft (2016) agree that task and technology are “more the products of external than internal factors”. and “society's technical sophistication” becomes one of the elements that take part in constraining and dictating internal behavior. Moreover, Shafaeddin (2014), Fleet, Fleet and Seperich (2014), Jaffe (2014) and Parmentola, Simoni, and Tutore (2015) explains that the forms and availability of technologies for a system are also specific to the environment and this technological diffusion also constrained by cost as well. Therefore, from a macro perspective, the scientific productivity demonstrated by a nation is associated with the economic capability of that nation, particularly, new and developing nations are most likely to remain limited in technical sophistication.

In portraying manufacturing technology in Bangladesh, Talukder and Jahan (2016) and Alam et al. (2017) mentions those Bangladeshi foundries, machine shops, and repair workshops shift towards and bloom as engineering types of equipment manufactures from typical equipment repairing works since 1980. Eventually, this swing from repairing or making spare parts to making equipment replaces costly imported pieces of equipment by locally manufactured ones. However, Rahman and Mayer (2015), Alam et al. (2017) and Talukder and Jahan (2017) point that this unrehearsed changeover with limited resources like scrap metal from shipbuilding, narrow skills and unreasonable confidence of these manufacturers just let their products stay at the extremity of quality, thus, operational efficiency. Besides absence of appropriate capital machinery, adequate knowledge on metallurgy, machine design and manufacturing processes, Talukder and Jahan (2016), Alam et al. (2017) Talukder and Jahan (2017) acknowledge the absence institutional

cooperation to formulate standards for locally made light engineering products, thus, compromised quality, constricted range of products and limited scale of operation.

Though these studies on Bangladesh accept ailing local technologies, there is no connection made with the manufacturing of substandard equipment with unsafe situations at the workplace. Waris, Liew, Khamidi, and Idrus (2014), for the Malaysian construction companies, identifies 19 criteria for selection of appropriate equipment for the construction works that includes equipment, efficiency, reliability, capacity, equipment control and machine standardization. On the other hand, for building projects in Australia, Feng (2013) finds that within a certain safety culture, safety investments (investments that help to carry on their work safely investments including equipment) has significant effect of the safety performance in the building construction, For the UK construction industry, in an inquiry into the underlying causes of construction fatal accidents over the accident reports, the study of Donaghy (2009) consider the equipment which quality is not affirmed as a cause for construction fatalities. Oswald, Ahiaga-Dagbui, Sherratt, and Smith (2020, p. 5), in their qualitative study on cost-safety tradeoff in the UK construction industry, finds the insinuation of plant resourcing decisions on the workers' safety; wherein the "cheap" inferior quality of equipment turns "lethal".

4.8.1.2 Emerged environmental factor 02: deficits in the higher education system

As of Agrawal, Sharma, and Kumar (2008, p. 886), Elwell (2013) and Zimmerman, Woolf and Haley (2015), education is the system for transmission of technical and cultural knowledge and skills, operating values and norms to the member of the society as well as build ability to collect and interpret information in for better problem solving and controlling of events. In particular, curriculum is the "educational path" that translates social values and needs into learning experience for a learner. Buyurgan and Kiassat

(2017) urge that , as curriculum development includes addressing the needs of the environment, the process of curriculum is to be dynamic and synchronized with the constantly changing environmental needs and emerging situations in industries.

On the other hand, related to learning in organization, Bess and Dee (2012) and Bess and Dee (2012a) explain, learning involves a balance between exploration of new knowledge and exploitation of what is already learned and occurs four social and psychological processes from individual to group then to organization: intuiting, interpreting, integrating, and institutionalizing. On the other hand, As individual level, same stimulus is interpreted differently due to difference in individuals' cognitive models that shape their views; intuition is a uniquely individual process pattern and is manifest in expertise or identification of a novel insight to new possibilities; groups and organizations do not own the capability to intuit, individual does. In the organization, learning is occurring when individuals' intuition creates shared meaning and understanding or interpreted, integrated into the action and finally implanted into the procedures of the organization or institutionalized.

In developing countries, in general, as of Dijk et al. (2015), the quality and coverage of occupational health and safety education among the nations are disappointingly low. In terms of Bangladesh higher education system, Husain and Osswald (2016) Mamun-ur-Rashid and Rhman (2017) Besides and Sultana (2018) note that, even there is abundance in universities at present, the quality of education suffers from underfunding, under-qualified faculty and poorly taught backdated designed-in-isolation curricula that eventually fails to transmit considerable practical or critical knowledge among learners. There is philosophical poverty and deficiency in critical understanding among learners to heighten their contribution in labor market. Particularly, for Bangladesh

technical university education, Biswas (2014) acknowledges the restriction of continuous development of curriculum and syllabus because of the absence of quality assurance initiatives. Though, the contribution of deficits in education system to unsafe situation is not demonstrated in these Bangladeshi studies, for Hong Kong construction industries, Rowlinson and Jia (2015) finds that the absence of pre-tertiary education in safety obstructs personal awareness of safety. Similarly, among the French apprentice, Boini, Colin and Grzebyk (2017) finds that workplace injury among the French apprentices with no occupational health and safety education is two times higher than that of individuals who previously received education at school.

4.8.1.3 Emerged environmental factor 03: Institutional corruption

However, Luo (2005), Søreide (2014), Pelizzo and Stapenhurst (2014) and Søreide (2016) state that though regulatory control implies inflexibility, decisions on regulations potentially get influenced in presence of corruption. Corruption is the administrative behavior that leads divergence or breach of norms specified in a given political context as well as from motivation of private advantages as bribery, fraud, extortion and favoritism induced to public role. Particularly bribery is form of bureaucratic corruption wherein the degree of the corruption is directed by the how scarce or abundant the benefits in questions are as well as the extents of quality requirement for particular allocation. On the other hand, as of Moore (2013), as open system organizations functions in environment, the conducive environment becomes one of the preconditions for an organization to operate particular function virtuously; eventually problematic environment tends to restrict functional virtues of an open system organization.

In Bangladesh, as of Sabet and Tazreen (2015), Mohammad (2015) and Rashid and Johara (2018), the tendency of high uncertainty avoidance and high collectivism greatly

account hatching corruption in administrative mechanism as mechanistic obedience to hierarchy, centralization, exploitation of discretionary influence, cherishing lobbying and sycophancy. About two-third of Bangladeshi households experience corruption between 2012-2015; besides, lower coverage and inferior quality of service delivery are social consequences of this non-integrity. In specific to construction industry, as of Mahmud (2007), Khan and Swapan (2013), Sabet and Tazreen (2015) and Ahmed et al. (2017), there is a trend to engage substantial amount of illicit costs to avoid any additional delay for in time consuming bureaucratic process of gaining approval from all the 16 government agencies entitled to issue permission for construction and utility connections in Bangladesh. In RAJUK, the statutory body issuing approval of permission for construction, the corruption is deep-seated that securing building permits without solicitation of bribe is nearly impossible. Besides, normally, there is an absence of honest and corruption-free site visits to confirm if actual construction conforms to the approved design. However, there is not only corruption through bribery that reaches down the inspector level and weaken enforcement for RAJUK, but there is also political influence over higher government representatives to bend the legislation to gain approval.

Though these pieces of literature on corruption in Bangladesh do not shed light on contribution of these corruptions in legal structures to unsafe work situations in Bangladesh housing construction industry, as of international literature like Jong, Henry and Stansbury (2009), overall, the flow of money to the wrong direction is the start of corruption, this bribe initiates chain of harmful events. This continues as selecting incompetent contractors, choosing unsafe designs, methods equipment, or materials, the fail to complete project or delivery of substandard projects.

4.8.1.4 Emerged environmental factor 04: highly fragmented supply chain

In the open system, as of Fleet et al. (2014), Daft (2016) and Daft and Marcic (2017), suppliers constitute raw material sectors for the organizational environment and directly influence the function of the organization. Shah (2009), Dolgui and Proth (2010) and Angkiriwang, Pujawan and Santosa (2014) state that, though supply chain works together to advance the flows of material and information between suppliers and customers lesser expenses, yet, greater promptness the design and operation of these overall networks of organizations are subjected to demand and supply, uncertainty and business strategy. Though the design of a supply chain for functional products aims meeting predictable demand cost-effectively, the supply chain for innovative products focuses on creating a cost-effective response mechanism for unpredictable demand. Thus, innovative products necessitate a responsive chain, and subcontracting is a proactive tactic of using external capacities in gaining flexibility on demand uncertainty where the nature of demand quantity, types, timing, and locations are improbable. Besides, Bess and Dee (2012), Scott and Davis (2016) and Dekkar (2017) point that open system organizations cannot ignore acting adaptively with the customers they serve, and mention of homeostasis wherein a system gets repaired itself under any threats from environment, rather that neutralizing the external influences.

Construction industry, as of Segerstedt and Olofsson (2010), Vidalakis, Tookey and Sommerville (2013), Akintan and Morledge (2013), Behera et al. (2015) and Al-Werikat, (2017), is different from other industries for site production, unique product and convergent, temporary and fragmented construction supply chain. Due to demand uncertainty, unique projects and requirement of the wide range of trades and materials and versatile expertise that one single firm cannot provide, the smaller yet narrow

specialization of firms are developed as subcontractors to meet the need. Moreover, Sherratt (2016, p.6) explains that in achieving high level of flexibility for a particular industrial environment with high fluctuation, subcontracting becomes a dominant segment in construction work process. Once, main contractor wins the contract, the work is broken down to in terms of requited skill to subcontractors and can be further divided into another level of subcontractors as "subs of subs of subs" to pass the work pressures and risks down to the lower levels. In Bangladesh, the real estate market, as of Reza (2016), Ahmed et al. (2017) and Gupta (2017), recently is facing challenges like scarcity in utility supply and available land and depletion of sales due to probable reason is political instability. The housing construction industry, accommodates 2.6 million workers as architects, engineers, managerial and direct and indirect labors through 200 large and 5000 medium and small construction firms. Projects not only recruit general or trade contractors, in Bangladesh, the multilayered labor subcontractors heavily dominate in informal recruitment, supply and management of the highly demanding low-cost and flexible construction labor.

Though these pieces of literature do not shed light on contribution of this multi-level subcontracting practices to unsafe situations for Bangladesh construction industries, pieces of literature from construction industries in other nations like Wiengarten and Longoni (2018) accepts that uncertainty in market, may control scheduling pressures end up with allotting inadequate time for performing operational activities, and eventually pushing workers in stressful conditions. Besides, in construction subcontracting process, Valluru et al. (2017, p.787), as well views subcontracting as a strategy of making projects more cost-effective as well as to transfer the occupational risks to the external parties; lowering the costs for the owners, subcontractors limit their costs by "pushing safety of their employees down the list of priorities".

4.8.1.5 Emerged environmental factor 05: highly price-sensitive labor contracting

To explain competition and organizational survival, Bess and Dee (2012) mention of concept of population ecology and suggest that organizations prosper on the basis of natural selection by the environment, thus, natural selection which pursues and finds organizations that are desirable and are prospective to be successful in that environment; otherwise, organizations shift to alternative environmental niches for survival.

Alternatively, Valence (2011), Valence, (2011a. p.107-111), Hill (2013) and Myers (2013) conceive that the level of the control over prices is directed by the intensity of competition in a market, which is guided by the number of firms and type of commodities. The market structure in interpreted on the product homogeneity or heterogeneity; where "services are homogeneous, while products can be differentiated". In a perfect competition market, the commodity offered by the firms are homogeneous, no entrance exit barrier, a significant number of providers and customers and complete information on market price, quality and cost condition are available to providers and customers. The small and medium-size contractors and labor-based subcontractors that do formworks belong to the perfect competition segment where the firms, "firms compete solely based on price".

In housing construction projects, as of Abbasianjahromi et al. (2016) and Polat (2016), though main contractors play as construction management agents, the trade, specialist, and labor-only-subcontractors carry out 80-90% of the actual production. The strategy of subcontracting is not only aimed at resource optimization in low resource situations but also to keep the risk to return ratio low in situations the main contractor has the capability of executing the work. However, Pang (2018) as quoted price by subcontractor remains as a vital determinant for conventional construction subcontracting practice, the mechanism of subcontracting operates through each level by extraction of

gain from an immediate level below; eventually, the risks are carried forward to minor labor subcontractors at the lowest level of sub- contracting.

For Bangladesh real estate, as of Ahmed et al. (2017), Srivastava (2017) and Gupta (2017), the land is the major component that accounts for 45–55% of the total cost and land is highly limited. Besides, two single companies holds 30% and 20% of the present market share, 6 companies together takes 25% and about 2,500 active yet small companies share the rest 25%. Thus, the market is highly exceedingly competitive for a particular segment so that it is difficult for these companies to distinguish their products within the same cost ranges except for architectural designs, besides customers are highly price sensitive.

In this Bangladeshi construction industry market, as of Reza (2016, p.52), to avail flexible labor at lower cost, the labor-outsourcing practices are dominated by secondary subcontracting by individual recruiters (labor Foreman, locally known as Sardar) operating in multilevel contracting system, thus, there is formation of additional layers in subcontracting for sub-letting of work. At every tier, eventually the interest of the capital is served; eventually, there is an absence of scopes of the labor protection in contracts. In particular, this study finds that driven by the notion of profit-maximizing through supplying this low-cost labor, these individual recruiters do not spend money on the safe working of these workers. Eventually, occupational safety remains the main concern; “ending up with onsite death” is not unusual for them. Similarly, for the Australian construction industry, Valluru et al. (2017) indicates that conditions involving a contracting workforce with the priority on cost-saving and cautious allocation of resources turns ignoring effort and time on managing safety beyond addressing immediately present hazards.

4.8.1.6 Emerged environmental factor 06: high-level urban migration of rural inhabitants into construction

As noted before, as of Poston and Bouvie (2010), Daft (2016) and Daft and Marcic (2017) sociocultural setting is a dimension an organizational general environment that comprises demographic characteristics, norms, customs, and values of the common people. In particular, demography is about the size, composition, and distribution of the human population and their changes, the component of changes, factors affecting them and the consequence of changes. The change in demography only occurs due to one of the three components of changes: fertility, migration, and mortality.

As of Poston and Bouvie (2010), Pauw, Collins, and Gouws (2017) and Samers and Collyer (2017), migration is people's geographical displacement from one location to another, within the nation as internal migration and across the nation or external migration. An individual's decisions in internal migration are wholly guided by the physical and social environment of the origin and destination as well as personal factors. In particular, the underlying mechanism of internal labor migration dominantly is the demand for labor in the urban area and supply of labor in rural areas. McConnell, Brue, and Macpherson (2017) hold that all things being equal the greater the annual earning gradient between employment in source and destination, greater the present value of the net benefits, thus more drive for migration.

On the other hand, in a system, as of Bess and Dee (2012a), the decision made by an individual is rarely under the condition of complete certainty due to apparent impossibility of having all the essential information for optimum decision-making. This uncertainty noted as a gambling metaphor that directs the selection of decisions on the ground of costs and benefits associated with different decision alternatives. In situations

where the outcomes are not assured, as an allegory to gambling the decision is made on the expected utility, where the expected utility is the probability that an individual will obtain personal benefits from a particular choice.

The practice of informal recruitment of migrant labor in construction industries, as of Lewis et al. (2015), Strauss and McGrath (2017) and Pang (2018), is yielded from neo-liberalism in creating demand and supply of migrant labor which leaves less room for provisions of labor protection; eventually there is multidirectional insecurities and exploitation. In relation to migrant workers in Bangladesh construction industry, Ye (2014), Reza (2016, p.47), Lata (2017) and Islam, Siddeqa and Biswas (2018), due to low produce, the people from agriculture sector with very low level of safety consciousness and equipped with only indigenous knowledge involve into internal migration for non-farm employments in off-season as a coping up strategy. Eventually, the capital city Dhaka, the second-fastest-growing megacity of the world with 18 million inhabitants becomes a destination of urban migration of 300,000 to 400,000 people a year. The construction industry becomes the choice of these unskilled trans-local migrants due to no skill requirement and on-site accommodation. However, these workers “remain at the bottom end of the labor markets” are so burdened with financial stresses that they embrace precarious employment at construction sites.

Though Reza (2016) connects these unskilled migrant workers with precarious activities in Bangladesh construction, Rowlinson and Jia (2015) on Chinese construction workers connects unfitting risk perception with unsafe situations. Rowlinson and Jia (2015), as a part of the collective mental programming of a society, a certain level of personal safety is acknowledged and internalized as threshold for decision making that

guides individuals' decisions to which extent their safety is compromised for other commitments.

4.8.1.7 Emerged environmental factor 07: deficit in regulatory system

The regulatory structures, as of Coglianese (2010) and Bennear and Coglianese (2013), are of four core components inherited to any regulatory scheme: regulator or creator and enforcer of regulation, target or to whom regulations are addressed, command or the content of control in defining boundary and consequences or what is imposed on the basis of conformity or violation. In particular, Both the two structures of command, that is mean standards (direct or refrain from action) and performance standards (recommend or forbid stated end states resulted by actions) vary with the level of stringency and specificity. Despite the standards are written with different levels of specificity targeting the same link of causal chain offer the varying degree of flexibility, performance standards are to specify the intended extent of performances without detailing how and offer more flexibility. However, monitoring and evaluation from regulators and a vivid understanding of the dose-response relationship between antecedents of the problem and the final consequence of concern are required in setting a level for optimal performance.

In Bangladesh, Chowdhury (2017) and Rahman (2018, p.98) notes, despite the overabundance of laws and policies, there are enormous deficiency in decent work, extensive violations of fundamental labor rights and labor laws due to defects in the labor law system and weak enforcement of standards or non-observance of labor rights in Bangladesh; as present laws do not "set out principles of safety management" for the industry. As of Sabet and Tazreen (2015, p.11) and Ahmed et al. (2018d) Bangladesh National Building Code (BNBC) which is the center-piece of legislation that oversees

building construction since 2006, still suffers from the large gap between codes and rules and in actual practice.

As of HBSI (2015), in BNBC of 2015, it is suggested that all wiring system be installed by electrician holding a relevant license (page 7-48, article 3.10.1, Chapter 3, part 7, volume 3). BNBC also suggests a safety committee where a safety officer will be a member secretary depending on the size and complexity of the project (page 7-31, article 3.1.2, Chapter 3, part 7, volume 3). However, this researcher fails to find sections in BNBC that discuss required license or qualification to define electrician or safety officer, the inclusion of customer, detail formation of the committee, and the parameters for the sizes of construction projects wherein a safety officer is to be involved. Therefore, there remains an absence of complete clarity in forming a safety committee to prevent unsafe situations as well as engaging electricians for safe installation.

Similarly, in BNBC of 2015, (page 7-15, article 2.1.2, Chapter 2, part 7, volume 3) in the researcher failed to find the maximum level of manual handling at a time permitted by an individual regardless of any method for manual handling. Regarding formwork and scaffold, (page 7-44, article 3.84, Chapter 2, part 7, volume 3), though it mentions that the minimum instructed diameter of the bamboo as 7.5 centimeters in the application as formwork, however, the distance between the vertical bamboos holding the formwork is not mentioned. Besides, BNBC of 2015 also suggest for precautionary marking such as “CAUTION: DO NOT USE NEAR ELECTRICAL EQUIPMENT” in (page 7-39, article 3.5.3, Chapter 3, part 7, volume 3) or “Danger 415 Volts” in (page 8-54, article 3.5.3, Chapter 3, part 7, volume 3). However, as they are in English, this constricts understanding of the workers who are not confirmed to have basic English language skills by the same BNBC. Thus, lack of specificity in the codes obstructs in safe designing of scaffolding and

the foreign language restricts interpreting of danger from the message of safety signage for them who do not have the reading ability of that language.

Besides, Chowdhury (2017) notes that the regional representatives from Department of Inspection for Factories and Establishments (DIFE) conduct inspection mostly after the accidents; the inspection system by DIFE is suffering from severe shortage of inspectors, restricted logistic and transport supports, lack of legal authority, and improper/ineffective inspection services and non-cooperation. According to the information provided by Secretary of Ministry of Labor, Mr. Mikail Shipar, The Daily Star (2017) also acknowledges, though manpower is increased from 318 to 993 between 2013-2017 and 300 inspectors in 23 districts, still it is not sufficient for looking over 8.3 million of establishments.

Pieces of literature straightforwardly mention the involvement of regulatory deficits in unsafe situations for Chinese industries; particularly, Gao, Fan, Wang, and Duan (2019) notes of inadequacy in classification and definition of governmental safety regulatory function. Based on the accident analysis, the study finds that among the nine regulatory function, if formulating plan, "the starting function of the entire government safety regulatory system" has the output of "unreasonable safety policies and safety goals" all the downstream functions "may change unexpectedly" which includes enacting the regulations, inspection, administrative handling, accident analysis, and emergency rescue. Similarly, for the Chinese industries, Wu and Chi (2015) and Liu et al. (2017), acknowledge that the limitations of legislation and enforcements yield inappropriate behaviors and risks; particularly government's improvement in law enforcement potentially reduces occupational accidents in Chinese industries including construction.

4.8.1.8 Emerged environmental factor 08: no involvement in safety partnership from housing customers

On the other hand, Bess and Dee (2012) and Dekkers (2017) hold that the underlying relationship between organization and environment is of input/output exchange; however, for a system, the execution of a process that delivers output, is exposed to environmental and internal disturbances. In rectification of these disturbances in input, resources, and throughput, a feedback mechanism is engaged as a control initiative that measures the process, output parameters, and intervenes upstream. This feedback from the receivers of organizational outputs provides information on sufficiency and quality of the delivered outputs into the focal organization; thus, this feedback takes a critical role in an adaptation of organizational functions to its environment and their dynamics of networked relation. In particular, sustained pressure on organizations from their customer places great burdens on an organization; eventually, as a tactic of sustenance, organizations often response by transforming that force and forwarding downward in the organization.

For the project, as Kerzner (2017) notes, commitments from the stakeholder are vital as the project expands and becomes complex, however, it is not realistic that all stakeholders will agree on all the decisions; thus, the long-term objective of the firm to get priority even if it is not in line with objective of projects or individual stakeholder. Despite the time, cost and scope being the three long considered primary project constraints, there can be multiple constraints like risk or customer relations potentially deviate from the success criteria of time, cost, and performance in a project. Due to this shift, which can happen at any instant of project life, there are tradeoffs in these triple constraints. Besides, Liu, Jazayeri, and Dadi (2017) and Zhang and Zou (2017) points that the operational excellence of construction industry starts from knowledgeable clients, particularly,

establishing and communicating owners' attitudes toward safety, establish contractual safety arrangement and ensuring owner's involvement in safety monitoring. For Bangladesh in readymade garments sector, Kayser (2018) depicts how the overseas customers and local manufactures include building safety considerations to their initiatives from awareness in safe production after the tragedy of Rana Plaza in 2013. However, in construction industry related pieces of literature like Kamal and Pramanik (2015a), Kamal et al. (2016), Jamil, Hossain, and Siddique (2018), the consideration of safe construction does not come as a factor of purchase decisions of Bangladeshi residential building customers.

Apart from these, As of HBSI (2015), the BNBC of 2015, article. 3.8.6 (in page 2-15, volume 1 and part 2 of Chapter 3) holds owners as responsible for taking proper safety measures and in parallel, article 3.1.2 (of page 7-31, Chapter 3 and part 7 of volume 3) does not include clients' role in the safety committee for an under-construction building. Similarly, in the Real Estate Development and Management Act 2010, as of Government of Bangladesh (2010), the article-18.3 (page 9074) holds the owner liable to abide by all necessary code in BNBC; thus, integrating clients into collaborative participation in construction safety is not established here too. Though, these pieces of literature on Bangladesh do not indicate this separation of clients from safety as a factor or unsafe situation at workplace, for Nigeria, Umeokafor (2017) finds that the lack of involvement of clients in safe construction is backed by the legislative gap in specifying client role and on construction firms in New South Wales, Australia, Sunindijo (2015) indicates that customers' preference for least price dictates contractor selection process and firms with financial insecurity take risk at work as investment on safety conformity do not have returns in terms of profits in business.

4.8.1.9 Emerged environmental factor 09: unskilled labor

For a system, as of Andreadis (2009), Ahmadi et al. (2014) and Eisenberg et al. (2018), learning facilitates individuals' innovation, problem-solving and modification of behavior to obtain improved performance for the system. Eventually, it leads to pinpoint ways to improve the work process and explore new thoughts to add value to products and services for the people involved in the work system. On the other hand, workers join with divergent levels of formal educational accomplishment and skills to the labor market; as of McConnell et al. (2017) and Borjas (2019), any activity that adds to the quality of labor potentially considers as an investment in human capital, particularly education. As education involves cost as expenditure of education itself as well as not being in the labor force, the decision of taking education is founded on three factors; length of an income stream, cost and earnings differential. Particularly, concerning the cost for education, Brue and Macpherson (2017) hold that other things being equal, the lower the direct and indirect cost of human capital investment, the greater the volumes of people find the investment profitable.

For Bangladesh technical education, as of Naznin and Karim (2016) and Dewan and Sarkar (2017), Bangladesh Board for Technical and Vocational Education and Training (TVET) offers 27 different courses through 5149 institutions and hold enrollment capacity of 4,56,614 students. However, there is a predominant deficiency in harmonizing the total technical and vocational education system in Bangladesh in terms narrow internship opportunities across the industries, distant from an industrial hub, lack in both publicly and privately allocated resources and lack of co-ordination among 23 ministries that contribute in capacity building of the nation. Though TVET is growing in the last 15 years, the overall enrollment of TVET still covers a small part of secondary education due

to cultural affinity to formal education. Besides despite TVET programs are built on basic education, many tend to join TVET to compensate lacks in foundational education.

There are both increasing requirements of skilled manpower, and the same time, absence of dedicated skill development facility in Bangladesh to impart construction work training. As of Hearle (2016), Reza (2016) and Ahmed et al. (2018), minimum eight years of formal schooling to get entry at skill training institutes, long term and expensive nature of training and personal pressure for money generation keeps the rural school dropouts with poor literacy and numeracy away from availing any skill training and they pushed to remain in their short-termed work. Eventually, among the construction workers, more than half of the (53.94%) have no education at all.

In spite of these Bangladeshi pieces of literature highlighting on a construction work force that does not directly implicate this unskilled labor on unsafe situations at construction sites, Hearle (2016) and Reza (2016) note that construction sites, unlike other industries, absorb unskilled and uneducated workers. Moreover, on the job learning becomes one of the few options for their career progression; thus, mostly, construction workers take up skill informally from peers or foreman through trial and error during work. Oswald et al. (2020), for the UK construction industry, acknowledge the construction industry as structured for unsafety and points out the engaging of workforce into tasks without proper training which leads to unsafe situations. The study explores the cheating the safety management system by conducting an unfairly safety assessment of cheaply available yet, hard-working and obedient workers and deploy them at work with unfamiliarity with safety.

4.8.1.10 General discussion on research objective 1

The finding indicates, even though unsafe situations happen at the point of occurrence, the environment external to an organization potentially influences the conditioning of unsafe situations. The environmental factors that are emerged in this study are also well captured from the Bangladesh context in several studies., however, there are elaborated as the social issue on Bangladesh context, none of these studies establish link empirically between these factors and unsafe situations. Moreover, this study also stands as partial empirical evidence for meta-analysis based causation proposition from different nations such as Khosravi et al. (2014), Williams et al. (2017) and Mohammadi et al. (2018) where safety is expressed as factors of society, organization, work context, etc. Including environmental factors in contributing to an unsafe situation, this study complements the studies on accident causation in Bangladesh construction that predominantly address contextual and immediate to the accident factors; such as Rahman et al. (2015), Islam et al. (2017) and Ahmed et al. (2018a). These findings are also to enrich the understanding of qualitative studies on the construction industry in other emerging nations such as Zahoor wt al. (2017) in Pakistan, Gomes et al. (2016) in Brazil where mostly organizational factors are explored.

The Swiss cheese model of accident causation presents accidents in terms of organizational influence, unsafe supervision, precondition for unsafe acts, and unsafe acts. Therefore, factors from the environment of the organizations as emerged in this cannot be explained by this model. On the other hand, the Domino theory includes only heredity or social condition of an individual as the only factor external to organization. Therefore, the factors from various sectors such as market, governance, industry, technology, raw materials that are emerged in this study cannot be explain by this theory. Similarly, the

socio-technical system model for workplace safety understands environment as economic environment, safety regulation, demography, and industry standards which does not explain clearly factors like customer of market sectors that has been emerged in this study.

However, the working situation of construction industry, unlike other industries in Bangladesh, in particular comparing readymade garment industries as noted by Kayser (2018), is not found to have influence from international platform; that construction industry is only involved with the local market, as noted by Reza (2016), might be the reason. Though, Interviewee 07 and interviewee 08 mentions of rates of interest in bank loans related to housing construction, this study does not find its contribution to the unsafe situation at the workplace.

4.8.2 Objective 2: To explore the organizational factors that contribute to unsafe situations at the workplace

In exploring organizational factors contributing to unsafe situations in the Bangladesh housing construction industry, 4 factors come out as the finding. The discussion of the 4 factors proceeds from Section 4.7.2.1 to 4.7.1.4 under Open System Theory as well as in correspondence to literature and Section 4.7.2.5 presents a general discussion on this second objective of the study.

4.8.2.1 Emerged organizational factor 01: Cost guided process decisions

In the open system, production or technical subsystems are the organizational units involved in processing raw material; for a dynamic system, as of Bess and Dee (2012) and Dekkers (2017) explains, the process occurs when events lead to activities that act on the system, thus, these actions might change both external and internal relationships of the system. However, the output of the processes is not always consistent in accomplishing their function within the environment due to irregularities that occur during a process is

conducted. Therefore, to achieve a predictable behavior, there is the necessity of controlling the primary processes through interventions of directing, feedback, feed-forward and completing deficiencies. Particularly, directing which taken as a norm is merely taking a one-time intervention for system control (such as, setting up parameter level or developing a structure) and aims to deliver desired output without additional intervention. On the other hand, environmental determinism as the degree of control the environment holds on the organization and perceived strategic choice is the extent that organizational leaders consider themselves capable of making responsive moves to guide the direction of the organization. Both environmental determinism and perceived strategic choices of leaders within organization guide the dynamics of reciprocal interdependence between organization and environment; wherein, in circumstances of perceived low choice, leaders hold that they are incapable as the external influence is beyond their control and in case of perceived high choices, leaders believe to act regardless the intensity of environmental determinism.

Construction work undergoes competitive tendering process globally where companies feels pressure to keep the bid value low in winning contract; as of Sherratt (2016) and Sherratt and Sherratt (2017), eventually, this sole emphasis on price develops perception to undermine other dimensions of construction works like quality, safety and sustainability. In every level, subcontracting causes further squeezing for-profit and leads further reductions in investment; in safety training, equipment, and safety management. Particularly, Bangladesh real estate market, as of Ahmed et al. (2017), Srivastava (2017) and Gupta (2017) is exceedingly competitive for 2,500 big to small active participant in market and the customers are not only highly price-sensitive; eventually for every standalone business prospect it is the price that dictates the decision. On the other hand, in

the Bangladesh construction industry, Hasan et al. (2017) identify the employers hold the mindset that safety measures involve additional cost to cause a lower profit and workers can carry out work without the existence of safety initiatives. And, Rahman et al. (2015) and Ahmed et al. (2018c), not only there is significant lack of attention from authority, the selection and recruitment of the labors are done on basis of payment too; thus, unskilled labor is preferred over skilled labor in Bangladesh construction sites. For the UK construction sites, Oswald et al. (2020) explores cost cutting strategies as acquiring cheaper inexperienced labor, despite reduces cost, heighten safety risks at sites.

4.8.2.2 Emerged organizational factor 02: Inappropriate administration of incentives

In an open system, as of Angle and Perry (1981) and Smith, Organ and Near (1983), Swezey, Meltzer and Salas (2009), Bess and Dee (2012), Elmore (2013) and Long (2013), primary task is the most essential element that each system or subsystem requires to do to survive. However, for functioning of organization, in the social system, the interrelations among the roles do not assure that people will accept or retain the roles to carry out the functions; the essential behavior is not limited to entering and remaining in system but also being motivated enough to exhibit dependable behavior as well as innovation and spontaneity. Thus, in open system organization, maintenance subsystems concern facilitation of human dynamics in getting the work done and endorses reward and sanctions as primary maintenance instruments in maintaining role performances. Bess and Dee (2012) and Bess and Dee (2012a) explain, if an employee knowingly recognize a reward as both possible and important, he is more likely put his effort toward receiving it. Thus, motivation is determined in terms of expectancy, instrumentality, and valence; that is, the perceived degree of motivation is a function of the product of workers' assessment of the likelihood that his effort will bring success and the summation of his judgment on

the organization's trend in rewarding. However, if the reward system of the organization emphasizes nourishing lower-order needs rather than the prospects for growth at the personal level, there is less receptiveness to the change to higher-order elements.

For the construction industries, Sherratt (2016, p.114) explains, there are both pressures of cost from strongly competitive and multi-layered tendering and in time delivery of a project. Thus, managing productivity in a restricted time and cost frame comes as a priority. On the other hand, as of Coze (2019) and Jurkiewicz and Giacalone (2016, p.6), if the organization is struggling to overcome some limit (unrealistic goals pursued from insecurity, ambition and competitive drive), the consequence is that some of the organizational members are pushed for very extreme performances. Besides, intensification of profit motives by manipulating process, policies or structures and externalizing the overheads and internalizing the profit is a structural dysfunction of an organization; in particular, the for the dysfunction of immediacy the reward system discount long-term performance in favor of just-in-time performance; eventually, employees tend to stay focus on immediate reward and ignore long time consequences. Moreover, per unit completed being the basis of payment, the priority to production comes ahead; Pang (2018) states, construction project payment are evaluated by unit allover chain to the lowest level or labor subcontractors, thus any delay in progress made at workers at bottom who are working on per diem rate creates liquidity problems along the chain.

Besides, Sherratt (2016), Smith, Sherratt and Oswald (2017) and Tchiehe and Gauthier (2017) understand that the tendency of securing financial gains from taking risk is universal and also in construction industry, eventually, construction enterprises skips rules, norms, and best practices and risk is accepted or tolerated to reduce cost. However, if safe working earns a reward safer working becomes a norm; thus, if an unsafe act brings a

positive consequence, the act persists. Among the UK construction workers, Oswald, Sherratt, and Smith (2017) observe monetary awards as the strongest among incentives; however, this reward or incentive program requires careful consideration in designing it to avoid unexpected or undesirable behavior as a byproduct. In the UK, Smith, Sherratt, and Oswald (2017) finds, shortcuts by unsafe acts or violations are encouraged by situations created by managements and holds bonus and payment schemes inspire speed and risk-taking. In terms of inappropriately placed incentives, both Oswald et al. (2017) and Coze (2019) address the BP Texas City refinery explosion of 2005. As of these pieces of literature, senior management of BP demands cost curtail without affecting conveyed to down to the line of management; however, for reward, lower managers responded in the best way to that conflicting demand and eventually, the safety of the processing facility is compromised.

4.8.2.3 Emerged organizational factor 03: Inefficient project management

In an open system, the managerial subsystem involves processes of influence on individual and groups and maintain congruency of the entire system with its environment in both stable conditions as well as under change and stresses. As of Daniel (2010), Bess and Dee (2012a), Dougherty (2014), Dima and Man (2015), regulatory mechanism and authority structure are the primary managerial components; regulatory mechanism gathers and utilizes intelligence for control, on the other hand, structure of authority involves so that organizational decisions are conformed until an alteration is in effect through valid channel. As the main concern for management of systems is not necessarily the resource availability, but mostly the inadequacy of predictable understanding on availability of those resources; thus, to guide a given system on a certain trajectory it requires collecting,

processing and transmitting a large quantity of data concerning the internal state of the system and its relations with the environment.

On the other hand, as of Bess and Dee (2012a, p.693), the processes of information acquisition, processing, and storage constitute organizational learning. Organizational learning is not just the collective volume of individual learning; it is the process of individually generated learning to get implanted within the structures, strategies, practices, and culture of the whole organization. However, the disconnectedness in knowledge from the individual to the organization comes if those in power tend to "claim that their positions have enabled them to learn how best to structure and control the organization".

On the other hand, as of Bess and Dee (2012), in the structure of the organization as the pattern of authority relationships, power and information flows, and transfers of inputs; however, the connections among the internal units are ambiguous to some extent due to the increased size and division of labor what formal hierarchical oversight cannot manage. As the system expands, the components taken in functions that are more differentiated and specialized, therefore, it requires a balanced integration of new specialization of components to make them work together organizationally and attitudinally. If not, the output of one component might not be taken as the input of another; eventually, there are tendencies among the segments to act independently as silos with the loose connection among them, detach from an institutional mission and prioritize the units over the organization as a whole.

For the complete or partial fail of a project, the poor financial estimation, unclear or unrealistic assumptions, absence of systemization of planning, insufficient data for planning, unbalanced priority of technical and business objectives, lack of attention given to individual and organizational aspects of the project, noninvolvement of end-user through

project or lack of sense of ownership are held responsible by Kerzner (2017). On the other hand, Jurkiewicz and Giacalone (2016) mentions of invariance and obduracy as organizational dysfunction; wherein management holds their way as the only right way and remains inflexible and rigid. Thus obstructs tacit inquiring, innovation and critical thinking.

Construction industries, among countries like India, Pakistan, Afghanistan, Sri Lanka, Malaysia, Indonesia and Vietnam, Islam and Trigunarsyah (2017) finds some common challenges along project execution: inconsistent planning and scheduling, loose integration of project and irregular cash flow, and particularly for Bangladeshi construction industry, the study finds unsuitable planning and scheduling, financial hurdles of both contractor and owner, and weak site management as challenges. Besides, in particular, the Bangladeshi housing industry has not demonstrated improvement enough for successful project management service; as of Islam and Suhariadi (2018, p.426), there is lack of professionalism in project management practices, thus, 'managerial issue has been a great concern" for this industry. For privately funded large building projects, the study finds that project financing as one of the major issues in managing projects. The projects suffer from poor feasibility assessment, partial disclosure of the financial capability of the project owners; eventually, the owner of the project faces challenges in funding. Besides, there is a mismatch in team development to control the schedule for a successful project delivery among the units, unfitting planning and scheduling from the owner, incorrect time and cost estimation by the contractors and inappropriate progress monitoring and cost controlling along with the project life.

4.8.2.4 Emerged organizational factor 04: lack of practice of learning in the organization

As Bess and Dee (2012) and Bess and Dee (2012a), any shift in environment, either transformational or incremental necessitate an alteration in the structures, processes, and behaviors within a system for organizational survival. Depending on applications, for operational balance between stability and change, the adaptive subsystem two feedback mechanisms: first is along the boundary on information regarding the change that raises concern of adaptation to survive, compete and exist successfully, the other one is internal, applied into the processes to evaluate the need for change for improvement.

However, open systems not only struggle to survive, but they also tend to adapt themselves and evolve with dynamic environment; as of Bess and Dee (2012a) and Dekkar (2017), the system and process behaviors are determined by how the transformation and control mechanisms handle with deviations that are forced through environmental interaction. Moreover, the complexity of the external environment and the rate of environmental change viewed by the organization determine organizational learning strategies.

The health of the organization lies in its adaptability, coherence of identity and ability to observe the external environment appropriately; as of Bess and Dee (2012) and Serrat (2017), organizations that have the higher likelihood to flourish are learning organizations that generate, transfer, and leverage their intellectual possessions. Moreover, a learning organization wherein an organization integrates personal mastery, shared vision, mental models and team learning that allows organizations to augment generative learning to adaptive learning so that mistakes in organizations are repeated rarely. However, that organizational culture assumes the pattern for a group in inventing, discovering, and

developing in learning to cope with its challenges with external adaptation and internal integration.

For the small and medium firms in construction industries in the UK, as of Rostami, Sommerville, Wong, and Lee (2015), there is reluctance in implementing risk management due to diverged perception among the involved parties and professional inadequacy to understand its rationale. Besides, they are issues related to individual knowledge, experience, and behavior, the study finds as primary barriers to mitigate risks. On the other hand, in Australian construction firms, as of Loosemore and Richard (2015), the notion of minimizing short-term capital costs, maximizing predictability of outcome through risk transfer and lowest price paradigm restrict unconventional thinking, thus, they are not open to innovation or have the mindset to pay for it. For the Chinese construction firms, as of Wei and Miraglia (2017), the organizational culture determines the project team member's decision to control, share and exchange project-related knowledge at different level; the study also observes knowledge hoarding tendency among the construction project, wherein, knowledge is applied selectively and based on personal relationship only. On the other hand, for UK construction firms, Takhtravanchi and Pathirage (2018, p.26) observe, in particular, the design teams are isolated from the construction teams due to the fragmented nature of the work. Besides, "the design team, specifically designers, are highly secretive, not keen to share their knowledge" due to the chances of misinterpretation of the information as well as the unauthorized reproduction of intellectual properties.

4.8.2.5 General discussion on research objective 2

Organizations, including construction firms, are a complex adaptive system. To survive and sustain, organizations are adaptive to the environment they function, That is,

organizational objectives, structures, work process, and techniques, coordinating activities differs largely varies with the environmental context. Similar Bangladeshi construction firm's characteristics are also noted in recent studies; however, there is no connection made between these present issues and unsafe situations by any of these studies. Studies in the causation of accidents in Bangladesh construction industries, such as Rahman et al. (2015), Hasan et al. (2017) and Ahmed et al. (2018) note limited organizational factors repeatedly like unskilled workforce, conformity, acquiring, usage and maintenance of PPE as a contributor to accidents. Thus, identified factors from this study belonging to transformation process decisions, project management reward system, organization adaptation particularly in learning are likely to widen the present understanding of organizational factors influencing unsafe situations for the context.

On the other hand, as noted before, the domino theory of accident causation observes the occurrence of accidents in terms of heredity, persons' fault, unsafe act or unsafe condition. Thus, this theory does not shed light on organizational contribution to unsafe situations. Though the Swiss cheese model includes organizational influence along the chain of accident causation, this model depicts that this influence contributes to precondition for unsafe acts only through the unsafe supervision. In that case, for this study, the emerged factor of cost guided process decision under production subsystem is the organizational factor that leads to unsafe situation without the element of unsafe supervision stated in Swiss chess model. According to the socio-technical system model for workplace safety, organizational context is outlined as a combination of safety culture and climate, labor-management relations, human resources, and organizational structure. Therefore, the factor from the adaptive subsystem, such as lack of practice in organization that has been emerged in this study is not explained. However, the study does not find any

factor under the Supportive subsystem that involves aiding the technical subsystem. There is an indication of material supply at sites from the Interviewees, however, they are no connection found with an unsafe situation.

4.8.3 Objective 3: To explore the individual factors that contribute to unsafe situations at the workplace

In exploring individual factors contributing to unsafe situations in Bangladesh housing construction industry, 3 factors come out as the finding. The discussion of these 3 factors proceeds from Section 4.7.3.1 to 4.7.3.3 under Open System Theory as well as in correspondence to literature and Section 4.7.3.4 presents a general discussion on this third objective of the study.

4.8.3.1 Emerged individual factor 01: perceived acculturative challenges

As of Bess and Dee (2012), in the social systems, the system is of an individual; in the inner core of the system there is personality and the person interacts is the social environment. Each gains a set of beliefs as he grows and develops; which is induced by culture and influenced environmental circumstances. However, Ward and Geeraert (2016), acculturation is about a shift in an individual's cultural patterns in practices, values, and identities ensuing from continued first-hand intercultural contact. This dynamic process of acculturation starts with intercultural contact and the challenges of this cultural transition are associated with perceived compatibility or distance between nature and characteristics of native and host culture. The degree of distance not only restricts achieving integration but also generates acculturative stress and adversely affects psychological and socio-cultural adaptation.

On the other hand, within an individual, as of Bess and Dee (2012a), the extent of complexity of information and number of alternatives generated are the two variables that

defines the information processing; thus, an optimum level of information, both qualitatively and quantitatively, are the requisites for an efficient decision making. These qualitative and quantitative proportions of information availability are subjected to optimization of environmental loads of information complexity, noxicity, eucity and uncertainty; and only situations offering moderate environmental loads yield efficient decision processing, and in overloads efficient decision-making declines.

In Bangladesh, despite noteworthy inequality between rural and urban areas in terms of education and employment, as of Ye (2014), Reza (2016), many of the relegated farmers and farmhands migrate to major cities during the lean season and constitute a majority of the construction labor force. Islam, Siddeqa, and Biswas (2018, p.21-25) points out that, in general, these farmers are only equipped with their indigenous knowledge and hold a low level of consciousness on safety matters at work. In Bangladesh construction sites, Ahmed, Islam, Hoque, and Hossain (2018) finds not only more than half of the workers in the construction industry do not have any education, but also more than one-third of the construction workers are observed to have nil to less than two years of experience in construction.

Sherratt (2016, p.77) acknowledges that the minimum difference between concept shared on what is safe and what is not leaves a significant likelihood of unsafe situations for the construction industry. In studying on Hispanic workers, in the U.S. construction industry, Al-Bayati et al. (2016), acknowledges that the inexperience lays in both executing the task and in particular site culture. And urges that, it is not only the issue of hiring inexperienced daily laborer but also those employers rarely provide any training as orientation for a particular type of project within a particular culture of work. In exploring safety management challenges for multi-national construction workforces in the UK, the

case study of Oswald, Sherratt, Smith, and Hallowell (2018) explores different working practices as the challenge of safety management surrounding general working practices. On the other hand, Hallowell and Yugar-Arias et al. (2016), among the Hispanic migrant workers among the US construction industry bring in their national characteristics that influence their perception of safe working which includes making careless decisions and disobey safety rules.

4.7.3.2 Emerged individual factor 02: a perceived dire need for money generation

In the social system, as noted before, as of Bess and Dee (2012), an individual is involved with two different systems: the social environment for him and the sets of sub-systems of within an individual, that is, personality, individual beliefs, and need disposition. Specifically, personality is the dynamic arrangement of psychological structures within the individual including general needs, self-concept, and personality characteristics, and cognitive and affective states. Moreover, it determines an individual's unique regulations to his external environment. Besides, out of personality and beliefs, there comes the corresponding unique combination of needs that direct individuals 'anticipation and desire surrounding the organizational system in maintaining equilibrium.

On the other side, as of Bess and Dee (2012a, p.854), an individual must fit into the needs of the organization for the system to be efficient and effective, at the same time organization must make adaptations to the needs of the individual. As of the path-goal leadership concept, the subordinate understands that leaders are capable to reward that he deserves to make the leaders capable to influence the subordinates. In determining leaders' behavior to induce subordinates in organizations' goals, leaders concern about two forms of contingencies: subordinates' characteristics and task characteristics. As motivation,

leaders make the payoffs of attaining goals “salient” while subordinates “must believe that their behavior determines leader support and that support is approaching”,

In quasi-spot contracts of employments, as of Tsui and Wu (2005) and Torka et al. (2005), Hom, et al. (2009), the employer holds a comparatively narrow band of contributions anticipated from an employee for a narrow band of inducements in return. Therefore, the firms demand only the execution of predetermined tasks. Moreover, Wang, Long, Zhang and He (2018) on assorted industries in China demonstrate that in quasi-spot contracts employment perceived social exchange between employee and employer is lower thus the type of employment positions role significantly in employee and employer relations.

In terms of migrant Bangladeshi construction worker, as of Dutta (2017) for Singapore and Deshingkar et al. (2019, p.8) for Qatar, the workers are “at the lowest rungs as unskilled or semi-skilled”, badly incorporated in the racially segmented labor market and embrace precarious work and exploitation to pay back the debt taken for migration back in home. Reza (2016), as well, finds an indebting scenario for trans local Bangladeshi migrants as paying back travel cost and family loans in installments and additional imposed wage cuts or irregular payments yield more distressful situations. Moreover, there is no skill training offered from contractors and upward career mobility is hurdled; thus, to earn more money, there is not much option left except to learn skills on the job for this flexible and hardworking labor force that is usually chosen by builders in Dhaka. In particular, Dutta (2017) explores that the cultural delivery of familial ties and a family necessity for work outlines the interpretation of predictability the workers construct around workplace risks among Bangladeshi migrant workers in Singapore, that is, in their perception the family necessity exceeds the concern for safety at work.

4.8.3.3 Emerged individual factor 03: safety adverse group norm

As of Bess and Dee (2012), an individual's organizational membership is his participation in the system of interconnected roles as well as his cognition and agreement with the normative prescriptions and proscriptions for behavior in interactions within-group and the probable affirmative or negative approvals for conformity or nonconformity with those expectations. Therefore, group norms, as a reflection of collective anticipations and standards for beliefs and behaviors, constitute the collective individual assessments of what is proper individual behavior that includes the norms of prioritization.

As of Rose et al. (2000) and Gaffney and Hogg (2017), in general, people tend to operate in their social environments by developing social cognitions like attitudes and values that optimize adaptation. The conformity involves into an individual's internalization of group norms due to a shared sense of values, or desire for recognition or persuasion to an association with a desired individual or group. Therefore, under the normative influence, an individual shapes his behavior for attachment or to avoid elimination from the group. Alternatively, human organizations as open Systems of roles; as of Fischer (2010), Long (2013) and Scott and Davis (2016), the role sent from role sender to focal person is intervened by group attributes.

For the construction industry of Hong Kong, Fang, Wu, and Wu (2015) finds that group norms are interpreted as workmate's influence directly associated with workers' safety behavior. Similarly, Choi, Ahn, and Lee (2017) finds workers' standard in safety behavior is significantly influenced by their perceived group norm among construction sites in the United States, Korea, and Saudi Arabia. For New Zealand, Guo, Yiu, and González (2015) understand peer pressure potentially modifies group members' safety attitude and safety behavior in New Zealand. Particularly, in Bangladesh construction

industry context, Reza (2016) notes that every migrant worker is a potential recruiter for the construction industry; as laborer is subcontracted, labor contractors use their networks to recruit individuals with previously acquired skills for trade works first, later ask the skilled workers to bring along the acquainted potentially hardworking yet unskilled workers with them. Once migrated, these unskilled laborers coming from villages join construction labor force under the supervision skilled migrant worker who recruits them personally. This group of unskilled workers is supervised, controlled and paid by the skilled worker. For a rural worker, it becomes impossible to find an urban construction site to work for without involvement of individual recruiters' control who utilizes this unskilled labor force for maximum output.

4.8.3.4 General discussion on research objective 3

Factors like the excessive engagement of migrant workers in Dhaka construction firms, the wide difference between rural and urban work experience and dire need of money generation are already illustrated in studies like Reza (2016), Islam et al. (2018); however, not their influence in an unsafe situation at construction. Thus the findings extend the present understanding of local individual factors by associating with unsafe situations in the construction industry. By integrating individual factors to unsafe situation in Bangladesh construction industry perspective, this study also supplement the current accident causation studies on the same context like Rahman et al. (2015), Islam et al. (2017) and Ahmed et al. (2018) where individual factors specific to sociocultural context is not included. How human personality shapes actions are directed by sociocultural context; thus, this findings might shed light as intervening situations in studies like Tao et al. (2017), Pourmazaherian et al. (2017) and Rau et al. (2018) where specific human

personality attributes are observed in association with accidents without taking account of socio-cultural contexts where human belongs.

The Domino theory observes human participation into an unsafe situation as just an error of the individuals. Thus, the factors involving a human in contribution to unsafe situation is not properly explained by this theory. Similarly, accident causation model like Swiss cheese model, the involvement of individuals in contribution to unsafe situation is also limited to unsafe acts. On the other hand, the socio-technical system model for workplace safety, views individual factors at workplace as individual's involvement at work with the use of tools and technology in a physical environment under organizational condition; thus the psychological aspect of the individuals are not incorporated. In addition, this model does not shed light on social aspects of individual, thus, the emerged factor of perceived safety adverse group norm is not explained by the model. Therefore, the factor like perceived dire need of money generation that has been emerged in this study is not explained by this model.

4.8.4 Objective 4: To explore how the identified factors contribute to unsafe situations at the workplace

In exploring how the explored factors contribute to unsafe situations individuals in Bangladesh housing construction industry, 3 scenarios are presented as the finding. The discussion of these 3 scenarios proceeds from Section 4.7.4.1 to 4.7.4.3 under Open System Theory as well as in correspondence to literature and Section 4.7.4.4 presents a general discussion on this forth objective of the study.

4.8.4.1 Scenario 1: The context and concern of organizations' cost directed production decisions

The organizations cannot avoid remaining maladaptive to clients or the population they serve. As of Bess and Dee (2012), Scott and Davis (2016) and Dekkar (2017), the open system tends to reach or move toward a balanced state; the tendency for a dynamic system to reach equilibrium is the homeostasis, which involves constant internal adjustments to remain in stable or in harmony with the environment. In particular, the systems adapt to follow the technique of morpohstasis to attain dynamic stability; wherein, systems tend to get repaired in perturbations in structure rather than neutralizing the external influences. Besides, in open system organizations, both environmental determinism and perceived strategic choices of leaders guide the dynamics of environment and organization relationships. Under circumstances of perceived low choice, leaders embrace that they are unable as the external influence is out of their control.

Besides, as of Bess and Dee (2012, p.113), organizations are human systems as well, where members pursue individual and collective goals and satisfaction. Roles are the expected behavior of the individuals evolved from task functions and integrate human with organizations; both organizational factors and personal factors intervene role sending and role receiving; organizational factors like size and type influences role expectation, on the other hand, the portion of the received role yields from focal persons' priority, drive and beliefs. Particularly, individuals as the dynamic arrangement of "psychological systems" within the individual including general needs, self-concept, personality characteristics, and cognitive and affective states. This dynamic arrangement determines an individual's unique regulations to his external environment exerting actions, work attitude, behavior, and value.

For the Bangladesh real estate market; as of Reza (2016), Ahmed et al. (2017), Gupta (2017), and Srivastava (2017), 8 real estate firms hold 75% of the market and the rest 25% by about 2,500 firms; these firms are supported by 5000 construction firms, besides, the clients are highly price-sensitive and there are recent drops in sales in housing sectors. Eventually, there is excessive competition over price to secure business in this multi-level construction supply chain. Besides, Sabet and Tazreen (2015) and Ahmed et al. (2017) finds transactional corruption in construction service organizations like RAJUK that causes additional costs to construction. Though clients' influence on safe working is not addressed in these Bangladeshi studies broadly, in New Zealand construction industry, Guo et al. (2015) find clients' influence on bidding process and price based bidding decisions, that eventually influence shrinking safety budgets as well as safety efforts and potentially lead to accidents. For the Brazilian construction industry, Garnica and Barriga (2018) extend that the shrinking of budget leads the firms to adopt less skilled manpower, substandard technology and overall misallocation of scarce existing resources.

In terms of substandard local technology, Talukder and Jahan (2016) and Alam et al. (2017) notes, local engineering industries are in transition from repairing equipment to manufacturing with their limitations in machinery, knowledge, skills and raw materials. With the absence of guidance from BSTI, in the end, these manufactured machines come to market as cheap yet without standardization and intended capability. Besides, as noted before, Moreover, as of HBSI (2015), BNBC of 2015 does not illustrate the detail of the equipment in erection operation (article. 3.9, page 7-15, volume 3, part 7, Chapter 3). Not only that the integration of customers in safe working at the site as noted before, clearly defined skills of engaged manpower, as noted in BNBC article 2.2 (Volume 1, Part1 and Chapter 2, page 1-3), are also inadequate and unclear.

In terms of labor in Bangladesh construction industries, as of Hearle (2016) and Reza (2016), no formal requirement of education, experience, and skills formal, informal flexible recruitment, easy entry, and onsite accommodation as well as high demand drive heavy rural to urban migration. Once entered, in-house learning for a long time becomes the only way for skill-building due to lack of skill, narrow options of developing skills and urge to shed financial liabilities. Though the risk perception of these trans-local migrant workers is not captured in these studies, for Bangladeshi migrant workers in Singapore, Dutta (2017) urges that family necessity for work outlines the interpretation of predictability the workers constitute on workplace risks.

4.8.4.2 Scenario 2: The context and concern of inefficient project management

In an open system, as of Bess and Dee (2012) and Dekkers (2017), the transformation process is subjected to environmental and internal disturbances. On the other hand, Dima and Man (2015) mention that, to guide a given system on a certain trajectory, the management of the system principally engages in finding the sequences of inputs. In doing so, it requires gathering, processing and communicating information regarding the internal state of the system and its relativeness with the environment; besides, organizations often seek information from their environments to reduce uncertainty.

On the other hand, as of Bess and Dee (2012), Elmore (2013), Scott, and Davis (2016), human organizations are open Systems of roles, where the role episode is a sequence of activities in terms of role expectations and associated behaviors. The role expectation is shaped under the influence of organizational factors, whereas, among the interpersonal factors that intervene role communication includes norms of acceptable group behavior. However, in the social system, the interconnection among the roles do not

guarantee anticipated behavior from individuals; thus, reward and sanctions are endorsed in maintaining anticipated role responses. In particular, if an individual meaningfully identifies a reward as both plausible and important, more likely he put his effort toward receiving it.

Besides, as of Sherratt (2016), Pang (2018) and Coze (2019); if the organization is struggling to overcome some constraints, to some extent its members undergo pressure for extreme performances. For the construction industry, the challenges of managing productivity as a prime objective under the restriction of both time and cost ceiling. In multilayered subcontracting construction works, the payment of one level is linked with the progress of the immediate level below; thus any slow move made by daily workers at the bottom ends up with payment issues along the chain. Besides, the construction industry, in New Zealand, as of Ramachandra and Rotimi (2015, p.48-49), enables "individuals and companies with little or no capital to start businesses". This industry also inherits a legitimate yet unique payment culture of "pay-if-paid and pay-when-paid" which is translated as 'work first, gets paid later' down the chain. As this industry is greatly reliant on the flow of cash to continue its functions, due to these reasons, this industry holds more business failure rates than any others do.

Bangladeshi pieces of literature like Ahmed et al. (2017), Gupta (2017) and Srivastava (2017) note Bangladesh real estate industry operates in highly competitive market with highly price-sensitive clients and Hasan et al. (2017) points the perception of constriction firms' owner as safety measures incurs cost, thus, trims the profit margin. However, pieces of literature from other countries like Tchiehe and Gauthier (2017) and Smith et al. (2017) incorporates safety as viewed and practiced based on financial achievement in business: thus, there is a widespread practice of risk-taking through

shortcuts and bypassing standard practices for financial gain. Moreover, Smith et al. (2017) accepts that safety violations, as well as unsafe acts, are fortified by management orchestrated circumstances such as incentives inspiring work speed; as a result, there are also risk-taking, short cuts in standard practices or following wrongful procedures in construction work.

For Bangladesh urban construction industry, the finding of Reza (2016) points out individual recruiters bring skilled and unskilled workers together. These unskilled workers are supervised and controlled by both skilled workers and individual recruiters in such a way that maximum output is extracted from the unskilled labor force. Though the matter of working in a group is not linked with unsafe situations for Bangladesh construction in Reza (2016), the work of Fang et al. (2015) observes that supervisory environment and group norms reflect on an individual's safety behavior in Hong Kong construction industry. Besides, Choi et al. (2017) for United States, Korea, and Saudi Arabia and Guo et al. (2015) for New Zealand construction industry finds individuals with tighter group identifications tend to internalize and conform to the group norms more; eventually, peer pressure potentially adjust individuals' safety attitude and safety behavior.

4.8.4.3 Scenario 3: Absence of effective learning throughout and its influences

The individuals interpret the same stimuli based on their formed cognitive maps and mentions of intuition as individuals' unique process of recognizing a pattern that builds insight on personal experience and expertise. As of Bess and Dee (2012), Bess and Dee (2012a), and Kim et al. (2017), organizational learning is a balance between exploitation of what is already learned and exploration of new knowledge and propagate from individual to organization in four social and psychological stages: intuit, interpret, integrate, and institutionalize. In particular, in the exploitation of already existing knowledge, the

transmission is conducted in a feedback process that returns information to groups and individuals for adjustment of actions based on outcome of applied learning; however, to expedite organization-level learning, the mental models of diverse individuals require coinciding to some points to construct and share knowledge.

On the other hand, Coglianese (2010) and Bennear and Coglianese (2013) in any regulatory scheme, a command is the content of control that outlines the boundary of action; however, a command is subjected to the level of stringency and specificity in mean and performance standards. Though the performance standards specify the intended extent of performances without detailing how the assessment of outputs is challenging when circumstances are poorly understood; eventually there is a lack of understanding of the dose-response connection between antecedents of problem.

Besides, Bess and Dee (2012a) mentions that individuals' decision-making behavior is a function of the interaction of individuals and the environment. Thus, an individual must fit into the needs of the organization for the system to be efficient and effective; at the same time, an organization must make adaptations to the needs of the individual. However, in organizations, in placing subordinates' actions in line with organizational objectives, leaders address to task characteristics and subordinates' characteristics that reflect individuals' perceived abilities and perceived need for achievement.

Though, Boini et al. (2017) point that formal safety specific education facilitates safe situations at a workplace; for Bangladeshi higher education context, Biswas (2014), Husain and Osswald (2016) and Sultana (2018) accept that curriculum is limited in developing learners' skills aligning to the labor market. On the other hand, Sabet and Tazreen (2015), Chowdhury (2017) note, there is an enormous gap between codes or rules

and their actual practice; and agencies like RAJUK dipped into financial corruption, political influences, and weak enforcement. Though these pieces of literature on Bangladesh are not found to connect with legislative and educational deficits with unsafe situations at industries, Hale, Borys and Adams (2015), on USA context, acknowledges that rules are not only dynamic but they are also required to be made with specificity to facilitate enforcement. Moreover, the consultant or employers need skills to interpret the complexity of the regulation and legal languages to apply in risk assessments and safe practices.

For Bangladesh, Hearle (2016) and Reza (2016), both acknowledge of lack of skill training establishments, too high entry requirement for a school dropout and financial obligations as challenges in skill development for the workforce; eventually learning of skill is informally done from peers or foreman by trial and error at work. The flow of knowledge along the construction industry is also observed as restricted by Wei and Miraglia (2017) in China and Takhtravanchi and Pathirage (2018) in the UK. These studies elaborate that not only inside knowledge is protected and shared based on personal relationships, but the knowledge is also restrictedly delivered by designers as well; eventually, there is poor awareness, participation, and management of tacit knowledge in the construction firms.

4.8.4.4 General discussion on research objective 4

This study observes the contribution of Environmental, organizational and individual factors on unsafe situations and describes 3 scenarios. As noted before, numerous pieces of literature pointed out the factors in Bangladesh construction industries; however, in studies in Bangladesh, the association of these factors are not associated with unsafe situations, nor explained how. Among the international pieces of literature, the

researcher only finds, the work of Man et al. (2017) on the construction industry in Hong Kong, that illustrates risk-taking behaviors in terms of social influence, situational influence, rewards, training, work experience, work schedule and demonstrate how. Though the combination and interactions of the factor are context specifics, the study of Man et al. (2017) finds similar factors connected to risk-taking, however, elements like institutional corruption is not presented in the work. This extends the present understanding of accident causations for Bangladesh construction industry pieces of literature like Rahman et al. (2015), Islam et al. (2017) and Ahmed et al. (2018) by demonstrating how the factors influence in particular for Bangladesh construction industry.

In early accident causation theories like Domino theory or Swiss model the complexity of accidents is not elaborately pictured in terms of interlinking between environment, organization and individuals involved. And even the recent one based on system perspective as Carayon et al. (2015) neither illustrate direct involvement of organizational environment on individuals not shed light on how the factors influence to unsafe situations. The finding of this objective illustrates the interaction and interceptions of the factors in an unsafe situation for the construction industry in Bangladesh; the study points out the discrepancy with the traditional wisdom of Domino theory and Swiss cheese model. Besides, environmental factors are connected with individuals both directly and indirectly by the organization that this study finds points the deficits of the theory by Carayon et al. (2015) that does not demonstrate direct link of environmental factors with individuals.

4.9 Chapter summary

At the start, the chapter elaborates perspectives of the analysis for this study, the researcher's position on translation, transcription, applications of analysis software and the selection of interviewees. Later the chapter proceeds with an analysis of the interviews and interprets and discusses findings under the light of theory and literature supports. The next chapter focuses on the summary of the findings, research implications, limitations, future research directions as well as the conclusion of this study.

CHAPTER 5

IMPLICATIONS, LIMITATIONS, RECOMMENDATIONS AND CONCLUSION

5.1 Introduction

This chapter first summarizes the entire study in terms of backgrounds, gaps, methods and findings followed by gaps addressed in the relevant body of knowledge, the contribution of the research as well as the implication of the study. This chapter also points limitation of the study, suggests for future researches and lastly draws the conclusion. This chapter integrates the whole thesis in terms of issues addressed, outcome availed and worthiness achieved.

5.2 Research Summary

The fact about the construction industry as a fast-growing and significant economy contributor yet counting the greater volume of accidents cause local and international researchers to attend the safety of the industry in their studies intensively. However, for a significant amount of period, safety-related studies continue holding the notion of an unsafe situation as dominantly involved with individual, and his error at the point of occurrence rather than interactions of wider system factors that contribute to individuals' actions towards unsafe situations. Thus, the repeated consideration of immediate circumstantial factors puts a barrier in understanding the holistic aspect of unsafe situation influencing factors as well as their mechanism of forming an unsafe situation for a context. Particularly for the Bangladesh construction sector, relevant studies remain inadequate to point out the factors of the unsafe situation and depict how they contribute as a comprehensive picture.

On basis of these unanswered matters as observed in recent pieces of literature in understanding unsafe situations, this study is necessitated on the specific industrial and geographical context; wherein, this study conceives that construction industry is an adaptive system that interacts and becomes subjective to its environment, and this study formulates 4 research objectives to attend the raised questions. In attaining the research objectives, this study holds a constructivist philosophical worldview that embraces non-experimental and single intrinsic case design to present a comprehensive understanding of what and how the aspect of unsafe situation contributing factors; for the same, data is gathered through purposely-sampled 15 in-depth interviews. In an analysis, this study follows both thematic and narrative analysis of the translated and transcribed interviews.

The first objective of this study is exploring environmental factors contributing to unsafe situations in the workplace. This study finds nine environmental factors. They are, inferior local manufacturing of construction equipment, deficits in the higher education system, institutional corruption, highly fragmented supply chain, highly price-sensitive labor contracting, high-level urban migration of rural inhabitants into construction, a deficit in the regulatory system, no involvement in safety partnership and unskilled labor at the national stage.

In response to the second objective of this study, exploring organizational factors contributing unsafe situations at work, this study finds 4 factors that contribute to unsafe situations in Bangladesh housing construction industry: cost guided process decisions, inappropriate administration of incentives, inefficient project management and lack of practice of learning in an organization.

The third objective of this study is exploring individual factors contributing to unsafe situations in the workplace. This study finds three factors associated with

individuals, that is, perceived acculturative challenges in distant work culture, perceived dire need for money generation, and safety adverse group norm. Finally, in response to the fourth objective of this study, how these identified factors contributing to unsafe situations, this study finds that environmental, organizational and individual factors both contribute to unsafe situations, as well as this study, describes three scenarios of an unsafe situation.

Scenario 1: Builders cost directed decisions come from three points: initiating the project with partial funding from early clients that books before project completion, customers' noninvolvement in safety makes it difficult to make them share safety-related expenditure and additional overhead due to institutional corruption. This uncertainty is diverted to and is carried by every next segment of the price-sensitive long supply chain. Less skilled migrated workforce and equipment with inferior technology are involved in the task and working becomes unsafe.

Scenario 2: On the other hand, project planning is made on uncertain and inadequate fund flow, yet, there is a rush to handover project to avoid adversity. Once there is a fund, every level of the supply chain requires is pushed faster to complete in time, incentives are assigned for faster progress. The group’s behavior is motivated by incentive too. They discourage anything that they view to hinder their progress, which also includes safe working that requires additional measures and attention at work.

Scenario 3: Deficit is education obstructs understanding and assessing work contexts. The ambiguity of legal instruments also adds misinterpretation of context in risk assessment. The organization has priority on cost and time; cost, time and knowledge hoarding restricts knowledge propagation. The migrant labor force that is already burdened financially, besides, learning skills from tradesmen at work is one of few options as there is an inadequate formal facility for skill development outside. Tradesmen are not open to

coaching; workers take risks to convince the tradesmen that they are worthy to become his apprentice.

5.3 Contribution of the study

In attending to the gaps in the relevant body of knowledge, this study also potentially contributes theoretically, methodologically and practically. They are as follows.

Theoretical contribution: This study finds factors from the environment, organization, and individual in contributing to unsafe situations. The industry is of the higher complex adaptive system, that is, it is not merely an open system, but also is complex and nonlinear in terms of its existence within a larger system linked with others at its level, advanced level, and lower level. Complex systems make links with various entities that exhibit a great degree of nonlinear interactivity. For these uncountable nonlinear relations among combined networks, it makes the system almost impossible to predict and control through linear chains of cause and effect relationship.

The earlier theory of accident causation like domino theory and Swiss cheese model are still widely adopted in accident causation pieces of literature. However, domino theory is regarded as emphasizing on human error, crude and inadequate for the complex system for being simplistic and linear. On the other hand, the Swiss cheese model of accident causation has limitations in understanding how accidents occur; moreover, the theory is also criticized for inheriting reductionism and the absence of a holistic presentation of the system. The study empirically presents an unsafe situation as a compound interaction of environment, organization, and individual factors. Thus, this empirical finding of the study points inconsistency with the conventional wisdom of these two theories.

The model by Carayon et al., (2015) demonstrate the influence of as a concentric layer of environment, organizations and human; as the outer layer surrounds the inner one, this indicates, environment as the outer layer influence human at the core through an organization. However, this study also finds that the environment has interaction with individual in contribution to an unsafe situation is not only through the organization, but it directly interacts with individual as well; in particular, the social factor of urban migration is connected with the unfamiliarity of the work context and financial liabilities in individual. Thus, this empirical finding hints a contradiction between empirical observation and the theory.

Methodological contribution: This study adopts a qualitative inquiry that empirically exhibits what environmental, organizational and individual factors contribute to the unsafe situation in the Bangladesh construction industry and how. By gathering first-hand data, this study attempts to address the issues that are present in current knowledge gained from a meta-analysis. The study is a qualitative inquiry with maximal data variation that has a focus on "how" aspects; this is assumedly unique in contextual grounds like unsafe situations in the Bangladesh construction industry.

Practical contribution: Understanding the factors contributing to an unsafe situation and their mechanisms of contribution are crucial for the prediction of those situations and their control. The industry, being the inhabitants of a higher complex adaptive system, has extensive interactions with analogous organizations, providers, clients, and compliments. The industry is in an adjustment of their resources and arrangement of transformation to respond to the alteration of the environment where the adaptableness and complexity come with the multiplicity in value activities. Unsafe situations emerge as the combined consequence of constituents that are on interaction in

numerous ways, rather than emerge from the behavior of constituents. Understanding how the constituents or work processes operate together as included in the larger system leads to the understanding of unsafe situations.

This study has focused on numerous environmental, organizational and individual factors related to an unsafe situation in Bangladesh construction industry rather than confining to the conformity of regulations or application of PPE; thus, this study potentially contributes in understanding to the context as well as means to control unsafe situations for the construction industry. The construction industry as important to socio-economic development and risky workplace together, the findings of this study might be important in managing a productive yet safe industry. The detail implication is given in the following section.

5.3 Research implications

From a realistic viewpoint, the findings of this study have focused on numerous important implications for workplace safety in the residential construction industry both in Dhaka and national context in Bangladesh in understanding the emergence of unsafe situations and eventually to initiate prevention. Thus, the findings of this study might contribute to achieving the construction industry as a safe workplace to offer labor.

The implication at national policy formulation: The study notices the necessity of clients' acknowledgment and participation in maintaining safe construction. Liu et al. (2017) point the importance of the owner's involvement during construction for safe execution. Particularly, Sunindijo (2015) notes customers' minimum price preference leads to risk-taking, as an investment in compliance does not generate business revenue. However, BNBC (volume 1, part 2, chapter 3, article 3.8.6 and page 7-31), Real Estate Development, and Management Act 2010 (article-18.3 and page 9074) indicate the only

owner as liable for conforming safety. Besides, BNBC (Volume 3, Part 7 and Chapter 3, article 3.1.2 on page 7-31) does not assure clients' participation in the safety committee. As neither BNBC nor Real Estate Development and Management Act 2010 integrates the participation of clients in safety initiatives during construction, the legislative organizations can review their policies so that customers' safety acknowledgment and safety participation is confirmed.

In this study, both higher education institutes and skill development centers are observed to have deficits in building workforce as well as in delivering applicable and industry demanded education and skills. Rowlinson and Jia (2015) indicate that the absence of pre-tertiary safety education puts barriers along with individuals' safety awareness. Therefore, along with updating the curriculum in higher education institutes, to ensure deployment of the appropriate labor force in the Bangladesh construction industry, there can be a standard for required safety knowledge, project management, and trade skills in the legal instruments. Thus, article 2.2 of BNBC (Volume 1, Part1 and Chapter 2, page 1-3) which is currently unclear and inadequate can be reviewed for engaging appropriate skills and qualification of manpower at various levels. Moreover, there can be a central enlistment system for the construction workforce to track both individuals and their skills for a particular trade. The study also finds that poorly constructed equipment contributes to unsafe situations. The standard of the technology, as well as the specification and application of the equipment, can be clearly outlined in the legal systems to control the manufacturing, distribution, and sales of substandard equipment. Thus, article 3.9 of BNBC (Volume 3, part 7, Chapter 3 at page 7-15) which does not illustrate the detail of the equipment in erection operation can be brought under review.

The implication to management level: The study finds that unfamiliarity with the work context contributes to unsafe situations. Al-Bayati et al. (2016) holds unfamiliarity to particular work context as a dimension of inexperience and points the requirement of orientation training for a particular project within a given work culture. As rural migrants come to work in the construction industry with a distant perception and habituation of task or context, organizations can arrange project orientation training to familiarize the whole workforce with the context in terms of work and anticipated behavior. The study also notes adverse individual responses to the incentives allotted for fast work completion. In organizations, the importance of being safe at the workplace is to be valued and safety initiatives are to be appraised. Oswald et al. (2017) observe financial incentives generate strong responses; however, a poorly aimed incentive program is likely to yield undesirable conduct as a byproduct. Therefore, the management requires designing their incentives carefully so that the incentives do not lead to unsafe acts or situations.

Besides, this study indicates the existence of weak learning cultures throughout the levels and that contributes to unsafe situations. Wei and Miraglia (2017) accepts that organizational culture regulates the flow of project-related pieces of knowledge among the project team members. Therefore, Bangladesh construction firms may take strategies that facilitate the development of learning cultures among managers, supervisors, and technicians. Apart from these, the study points deficits in managing projects which includes improper planning of the project particularly in terms of assessing fund flow. Islam and Trigunarsyah (2017) finds inconsistent planning and scheduling and irregular cash flow as common to south Asian construction projects. Therefore, in Bangladesh construction firms, a project requires to be initiated when a realistic estimation is made on the fund flow.

The implication to individual and group level: The study finds that individual situations like acculturative challenges and financial pressure contribute to unsafe situations rather than individual particular accident-prone personality traits. However, Shen et al. (2017) and Casey et al. (2017) refer to shared social context as a strong foundation of individual task engagement, eventually, individuals are more cautious when there exists a shared social context that is conducive to safe working.

The finding of the study also indicates that the group norms shape individuals' perspective of acting safely at the workplace; especially peer pressure to prioritize speed over safety in task completion contributes to unsafe situations. Sherratt (2016) admits that safety is a shared concept, thus what is perceived as safe and unsafe in common leaves by potential ground for unsafe situations in the construction industry. Therefore, the group leaders need to understand how the group members perceive safety at work; there can be team interventions to shape a common and constructive perception of safe working.

5.5 Limitations of the study

Various pieces of literature note that practically research may have boundaries. Even though this study put efforts in widening present understanding of the unsafe situation for Bangladesh construction, the study as well as observes two of its limitations. First, an unsafe situation can be emerged from the dynamic interaction of the system agents, as the study explores 16 factors that emerge as category and explains the mechanism of these factors to unsafe situations in three scenarios. Due to constraints on time and other resources, the study does not cover all possible factors and the combinations of interactions to the unsafe workplace. There is a likelihood that many of the scenarios are yet to explore with the possible inclusion of more factors.

Secondly, the analysis is conducted on the interpretation of the data taken from an in-depth interview of the individuals from the Dhaka housing construction industry what he believes as experienced, knowledgeable and appropriate for this study within scopes. Thus, with substantial resources, the genres of the interviewees can be extended further. Moreover, the researcher synthesizes the findings from what the interviewee expresses on that particular location and time is taken in account, due to this, there can be biases like transient mood state of the interviewee that is not in control of the researcher. Moreover, these findings are not generalized over the population, as the samples are not representative as a purposive sample taken for this study.

5.6 Recommendations

Though this study addresses several crucial questions related in terms of understanding unsafe situations, the conclusions and propositions synthesized from this study remain provisional until other studies confirm the findings by identical or alternative research methodologies. An enhancement of the current study, to offer a more complete picture of the situation as it stands, the future researchers might integrate the following concepts along with measures to minimize the limitations that the study encounters.

Firstly, there can be quantitative inquiries to examine the interactions for the same context. There can be qualitative studies on similar fields to explore additional factors and interactions as well. Secondly, this study has its focuses only on the housing industry of Bangladesh. As, overall, the construction industry in Bangladesh is noted for unsafe situations, the current study can be replicated into other segments of the construction industry; such as commercial buildings and civil infrastructures like roads and bridges built for public services.

5.7 Research conclusion

Human life is priceless. Though vital for the national economy, the construction industry earns disrepute for high frequency and magnitude of accidents. The unsafe situation in the construction industry can be predicted if the unsafe situations are well understood in terms of what and how contributes to unsafe situations. Unsafe situations emerge from interactions of environmental, organizational and individual factors rather than just factors at the point of occurrence.

The study finds, factors of the environment like substandard technology, financial corruption, migration of unskilled workers into construction industry, inadequacy in legal structure and enforcements, clients nonparticipation, multi-tiered and price-sensitive subcontracting practice in industry, unfitting education system and non-organized skill development facilities contribute both organization and individuals directly and indirectly in terms of unsafe situation.

The study finds, within the organizations, factors like price-sensitive production decisions, poor project management, unfitting incentives, and weak learning culture also contribute to an unsafe situation at work. In addition, unfamiliarity with work context, burdened with financial pressure and group dynamics lead an individual to work in risky situations. The study reaches its objectives to explore what and how aspects of factors contributing to unsafe situations on a wide horizon of Bangladesh housing construction industry which is new in context; thus, contribute in filling the gaps in understanding of on influencing factors of unsafe situations as well as theories confined to factors adjacent to point of occurrence. The minimization of unsafe situations is likely to be successful if the adverse interactions of the factors towards unsafe working are restricted.

REFERENCES

Abbasianjahromi, H., Rajaie, H., Shakeri, E., & Kazemi, O. (2016). A new approach for subcontractor selection in the construction industry based on portfolio theory. *Journal of Civil Engineering and Management, 22*(3), 346-356.

Agrawal, S., Sharma, P. B., & Kumar, M. (2008). Knowledge Management Framework for Improving Curriculum Development Processes in Technical Education. *Third International Conference on Convergence and Hybrid Information Technology* (pp. 885-890). Busan: IEEE .

Ahmad, R., Usop, H., Ismail, A., Bujang, S., & Mansor, N. N. (2014). *Conducting research in social sciences and management studies: Practical step by step guide* (2nd ed.). Kuching, Sarawak, Malaysia: RS Publishing House.

Ahmadi, A., Daryani, S., & Bevrani, H. (2014). Evaluation of organizational learning process based on Marquardt Model. Case study: Municipality of Noor City, Iran. *International Journal of Management and Innovation, 6*(1), 56-62.

Ahmed, I., Gajendran, T., Brewer, G., Maund, K., Meding, J. V., & MacKee, J. (2018d). Compliance to building codes for disaster resilience: Bangladesh and Nepal. *Procedia Engineering, 212*, 986–993.

Ahmed, I., Shaukat, M. Z., Usman, A., Nawaz, M. M., & Nazir, M. S. (2018b). Occupational health and safety issues in the informal economic segment of Pakistan: a survey of construction sites. *International Journal of Occupational Safety and Ergonomics (JOSE), 24*(2), 240–250,.

Ahmed, J. U., Sultana, H., & Faroque, A. R. (2017). Eastern Housing Limited: Marketing Strategies of a Real Estate Company in Bangladesh. *Vision, 21*(1), 86-92.

Ahmed, S., Hoque, M. I., Islam, M. H., & Hossain, M. (2018a). A Reality Check of Status Level of Worker against Skilled Worker Parameters for Bangladeshi Construction Industry. *Journal of Civil Engineering and Construction, 7*(3), 132-140.

Ahmed, S., Islam, H., Hoque, I., & Hossain, M. (2018). Reality check against skilled worker parameters and parameters failure effect on the construction industry for Bangladesh. *International Journal of Construction Management*, 2018, 1-11. https://doi.org/10.1080/15623599.2018.1487158

Ahmed, S., Sobuz, M. H., & Haque, M. I. (2018c). Accidents on construction sites in bangladesh: a review. *4th International Conference on Civil Engineering for Sustainable Development (ICCESD 2018)* (pp. ICCESD-2018-4599-1 to 8). Khulna: Khulna University of Engineering & Technology (KUET), Khulna, Bangladesh.

Akintan, O. A., & Morledge, R. (2013). Improving the Collaboration between Main Contractors and Subcontractors within Traditional Construction Procurement. *Journal of Construction Engineering*, 2013, 1-12.

Alam, M. M., Khan, M. I., Saha, C. K., Rahman, A., & Bhuyian, M. G. (2017). Manufacturing of agricultural machinery in Bangladesh:opportunities and constraints. *Agricultural Engineering International: CIGR Journal*, *19*(1), 122-135.

Alamgir, F., & Banerjee, S. B. (2018). Contested compliance regimes in global production networks: Insights from the Bangladesh garment industry. *Human Relations: The Tavistock Institute*, 2018, 1-12.

Al-Bayati, A. J., Abudayyeh, O., & Albert, A. (2018). Managing active cultural differences in U.S. construction workplaces:Perspectives from non-Hispanic workers. *Journal of Safety Research*, *66*, 1-18.

Al-Bayati, A. J., Abudayyeh, O., Fredericks, T., & Butt, S. E. (2017). Reducing Fatality Rates of the Hispanic Workforce in the U.S. Construction Industry: Challenges and Strategies. *Journal of Construction Engineering and Management*, *143*(3), 04016105-1-10.

Aliabadi, M. M., Aghaei, H., Kalatpour, O., Soltanian, A. R., & Nikravesh, A. (2018). Analysis of human and organizational factors that influence mining accidents based on Bayesian network. *International Journal of Occupational Safety and Ergonomics*, 2018, doi: 10.1080/10803548.2018.1455411

Alingh, C. W., Strating, M. M., Wijngaarden, J. D., Paauwe, J., & Huijsman, r. (2018). The ConCom Safety Management Scale: developing and testing a measurement instrument for control-based and commitmentbased safety management approaches in hospitals. *British Medical Journal Quality and Safety, 27*(10), 807-817.

Alingh, C. W., van Wijngaarden, J. D., Paauwe, J., & Huijsman, R. (2015). Commitment or Control: Patient Safety Management in Dutch Hospitals. In R. Valle-Cabrera, & A. López-Cabrales (Eds.), *New Clues for Analysing the HRM Black Box* (pp. 97-124). Newcastle upon Tyne, UK: Cambridge Scholars.

Almanae, M. (2007). Organizational Environment and its effect on Performance-Applied study in Insurance Companies in Libya, Brno. *Acta Universitas Agriculturae et Silviculturae Mendeliane Brunensis , 55* (3), 9-22.

Al-Werikat, D. G. (2017). Supply Chain Management In Construction; Revealed. *International Journal of Scientific & Technology Research, 6*(3), 106-110.

Amponsah-Tawaih, K., & Adu, M. A. (2016). Work Pressure and Safety Behaviors among Health Workers in Ghana: The Moderating Role of Management Commitment to Safety. *Safety and Health at Work, 7*, 340-346.

Andreadis, N. (2009). Learning and organizational effectiveness: A systems perspective. *Performance Improvement, 48*(1), 5-11.

Anfara, V. A., & Mertz, N. T. (2015). Theoretical Frameworks in Qualitative Research. Thousand Oaks, CA, USA: Sage Publications.

Angkiriwang, R., Pujawan, I. N., & Santosa, B. (2014). Managing uncertainty through supply chain flexibility: reactive vs. proactive approaches. *Production & Manufacturing Research:An Open Access Journal, 2*(1), 50-70.

Angle, H. L., & Perry, J. L. (1981). An Empirical Assessment of Organizational Commitment and Organizational Effectiveness. *Administrative Science Quarterly*, 26(1), 1-14.

Averill, J. B. (2015). Qualitative Data Analysis. In M. d. Chesnay (Ed.), *Nursing research using data analysis : qualitative designs and methods in nursing* (1st ed., pp. 1-10). New York, NY, USA: Springer Publishing Company, LLC.

Awwad, R., Souki, O. E., & Jabbour, M. (2016). Construction safety practices and challenges in a Middle Eastern developing country. *Safety Science, 83* , 1-11.

Aziz, N. A., Ali, Z., & Hassan, A. (2014). Industry Structure and Market Concentration: Case of Malaysian Construction Industry. *National Research & Innovation Conference for the Graduate Students in Social Sciences 2014* (pp. 1300-1312). Port Dickson: Faculty of Economics and Management, Universiti Putra Malaysia; .

Baicchi, A. (2015). *Construction Learning as a Complex Adaptive System : Psycholinguistic Evidence from L2 Learners of English.* London, England: Springer.

Bakker, A. B., & Demerouti, E. (2007). The Job Demands-Resources model: state of the art. *Journal of Managerial Psychology, 22*(3), 309-328.

Bal, C. S. (2016). *Production Politics and Migrant Labour Regimes: Guest Workers in Asia and the Gulf* (1st ed.). Basingstoke, UK: Palgrave Mcmillan.

Bangladesh Bank. (2019, 1 2). *Overview of Financial system of Bangladesh*. Retrieved 1 2, 2019, from Bangladesh Bank official website: https://www.bb.org.bd/fnansys/index.php

Baradan, S., Dikmen, S. U., & Kale, O. A. (2019). Impact of Human Development on Safety Consciousness in Construction. *International Journal of Occupational Safety and Ergonomics*, 25(1), 40-50.

Baynham, M. (2019). Narrative and Space/Time. In A. D. Fina, & A. Georgakopoulou (Eds.), *The Handbook of Narrative Analysis* (1st ed., pp. 119-139). Hoboken , NJ , USA: Willey Blackwell .

Bazeley, P. (2013). *Qualitative Data Analysis: Practical Strategies* (1st ed.). Thousand Oaks, CA, USA: Sage Publications.

Bdnews24. (2017, 5 1). *No safety measures for construction workers.* Retrieved 12 28 , 2018, from BDNEWS24.COM: https://bdnews24.com/bangladesh/2017/05/01/no-safety-measures-for-construction-workers

Behera, P., Mohanty, R., & Prakash, A. (2015). Understanding Construction Supply Chain Management. *Production Planning & Control: The Management of Operations, 26*(16), 1332-1350 .

Bellamy, L. J. (2015). Exploring the relationship between major hazard, fatal and non-fatal accidents through outcomes and causes. *Safety Science, 71*, 93-103.

Bellamy, L. J. (2018). Doing What Is Right or Doing What Is Safe: An Examination of the Relationship Between Professionalization and Safety. In C. Bieder, C. Gilbert, B. Journé, & H. Laroche (Eds.), *Beyond Safety Training:Embedding Safety in Professional Skills* (1st ed., pp. 85-96). Cham, Switzerland: Springer .

Bennear, L. S., & Coglianese, C. (2013). Flexible approaches to environmental regulation. In S. Kamieniecki, & M. Kraft (Eds.), *The Oxford Handbook of U.S. Environmental Policy* (pp. 582-603). New York , NY, USA: Oxford University Press .

Bentley, M. E., & Pequegnat, E. E. (2011). Qualitative Inquiry: An End Not Just a Means. In W. Pequegnat, E. Stover, & C. A. Boyce (Eds.), *How to Write a Successful Research Grant Application:A Guide for Social and Behavioral Scientists* (2nd ed., pp. 163-172). New York , NY, USA: Springer .

Besnard, D., & Hollnagel, E. (2014). I want to believe: some myths about the managementof industrial safety. *Cognition, Technology and Work, 16*(1), 13-23.

Bess, J. L., & Dee, J. R. (2012). *Understanding College and University Organization: Theories for Effective Policy and Practice* (Vol. 1). (D. B. Johnstone, Ed.) Sterling, VA, USA: Stylus Publishing LLC.

Bess, J. L., & Dee, J. R. (2012a). *Understanding College and University Organization: Theories for Effective Policy and Practice* (Vol. 2). (D. B. Johnstone, Ed.) Sterling, Virginia, USA: Stylus publishing Llc.

Betcherman, G. (2014). *Labor Market Regulations: What Do We Know about Their Impacts in Developing Countries?* The World Bank, Capacity Building Unit. Washington, D.C.: The World Bank.

Bhuiyan, A. J., & Haq, M. N. (2008). Improving Occupational Safety and Health in Bangladesh. *International Journal of Occupational and Environmental Health, 14*(3), 231-233.

Biswas, D. S. (2014, 12 25-26). problems of tertiary engineering education of Bangladesh: some suggestions for possible improvements. *International Conference on Mechanical, Industrial and Energy Engineering 2014*, pp. ICMIEE-PI-1403401-6.

Blanton, R. G., & Peksen, D. (2018). Pro-Market Policies and Major Industrial Disasters—A Dangerous Combination? *Sociological Forum, 33*(1), 5-30.

Boini, S., Colin, R., & Grzebyk, M. (2017). Effect of occupational safety and health education received during schooling on the incidence of workplace injuries in the frst 2 years of occupational life: a prospective study. *BMJ Open, 7*, e015100.

Bordens, K. S., & Abbott, B. B. (2018). *Research Design and Methods: A Process Approach* (10th ed.). Dubuque, IA: McGraw-Hill Education.

Borjas, G. (2019). *Labor Economics* (8th ed.). New york, NY, USA: McGraw-Hill Education.

Borneo post, t. (2018, July 13). *Malaysia's construction industry has highest fatality rate.* Retrieved 29.07.2018, from The borneo post online: http://www.theborneopost.com/2018/07/13/malaysias-construction-industry-has-highest-fatality-rate/

Bosak, J., Coetsee, W., & Cullinane, S. J. (2013). Safety climate dimensions as predictors for risk behavior. *Accident Analysis and Prevention, 55*, 256-64.

Braun, V., & Clarke, V. (2013). *Successful Qualitative Research: A Practical Guide for Beginners* (1st ed.). Thousand Oaks, CA, USA: Sage Publications.

Brewer, C. P., Douphrate, D., Whitehead, L., DelliFraine, J., Taylor, W. C., & Klyza, J. (2017). The impact of job control on employee perception of management commitment to safety. *Safety Science, 93*, 70–75.

Brezis, M., & Wiist, W. H. (2011). Vulnerability of Health to Market Forces. *Medicalo Care, 49*(3), 232-239.

Bristol, T., & Scott, C. L. (2014). Cross-Cultural Team Opportunities and Global Implications. In E. b. Scott (Ed.), *Diversity in the Workforce: Current Issues and Emerging Trends* (1st ed., pp. 312-333). New York , NY, USA: Routledge .

Bronkhorst, B. A. (2018). *Healthy and Safe Workplaces in Health Care: Examining the role of safety climate.* Rotterdam, Netherlands: Optima Grafsche Communicatie.

Brownsword, R., & Goodwin, M. (2012). *Law and the Technologies of the Twenty-First Century: Text and Materials* (1st ed.). Cambridge, UK: Cambridge University Press.

Bryman, A. (2012). *Social Research Methods* (4th ed.). Oxford, New York, USA: Oxford University Press Inc.

Buyurgan, N., & Kiassat, C. (2017). Developing a new industrial engineering curriculum usinga systems engineering approach. *European Journal of Engineering Education, 42*(6), 1263-1276.

Cacciabue, P. C. (2004). *Guide to Applying Human Factors Methods: Human Error and Accident Management in Safety-Critical Systems* (1st ed.). London, England: Springer-Verlag.

Camilius, E. C. (2011). *The Epistemology of Motivation: Harnessing the Art.* Dartford , UK: Xlibris Publishing .

Carayon, P., Wetterneck, T. B., Rivera-Rodriguez, A. J., Hundt, A. S., Hoonakker, P., Holden, R., et al. (2014). Human factors systems approach to healthcare quality and patient safety. *Applied Ergonomics, 45*(1), 14–25.

Carayon, P., Hancock, P., Leveson, N., Noy, I., Sznelwar, L., & Hootegem, G. v. (2015). Advancing a sociotechnical systems approach to workplace safety – developing the conceptual framework. *Ergonomics, 58*(4), 548–564.

Carrillo-Castrillo, J. A., Rubio-Romero, J. C., Onieva, L., & Lopez-Arquillos, A. (2016). The Causes of Severe Accidents in the Andalusian Manufacturing Sector: The Role of Human

Factors in Official Accident Investigations. *Human Factors and Ergonomics in Manufacturing & Service Industries , 26*(1), 68–83 .

Carrillo-Castrillo, J. A., Trillo-Cabello, A. F., & Rubio-Romero, J. C. (2017). Construction accidents: identification of the main associations between causes, mechanisms and stages of the construction process. *International Journal of Occupational Safety and Ergonomics, 23*(2), 240-250.

Casey, T., Griffin, M. A., Harrison, F., & Neal, A. (2017). Safety climate and culture: Integrating psychological and systems perspectives. *Journal of Occupational Health Psychology, 22*(3), 341-353.

Chakraborty, T., Das, S. K., Pathak, V., & Mukhopadhyay, S. (2018). Occupational stress, musculoskeletal disorders and other factors affectingthe quality of life in Indian construction workers. *International Journal of Construction Managemet, 18*(2), 144-150 .

Cheng, H. G., & Philips, M. R. (2014). Secondary analysis of existing data: opportunities and implementation. *Shanghai Archives of Psychiatry, 26*(6), 371-375.

Chesnay, M. d. (2015). Series Foreword. In M. d. Chesnay (Ed.), *Nursing research using data analysis : qualitative designs and methods in nursing* (1st ed., pp. xvii-xxii). New York, NY, USA: Springer Publishing Company LLC.

Chi, C.-F., Lin, S.-Z., & Dewi, R. S. (2014). Graphical fault tree analysis for fatal falls in the construction industry. *Accident Analysis and Prevention, 72* , 359–369.

Chia, J., Harun, A., Kassim, A. W., Martin, D., & Kepal, N. (2016). Understanding factors that influence house purchase intention among consumers in kota kinabalu: an application of buyer behavior model theory. *Journal of Technology Management and Business, 3*(2), 94-110.

Choi, B., Ahn, S., & Lee, S. (2017). Role of Social Norms and Social Identifications in Safety Behavior of Construction Workers. I: Theoretical Model of Safety Behavior under Social Influence. *Journal of Construction Engineering and Management, 143*(5), 04016124-1-13.

Chong, H. Y., & Low, T. S. (2014). Accidents in Malaysian Construction Industry: Statistical Data and Court Cases. *International Journal of Occupational Safety and Ergonomics, 20*(3), 503-513.

Chowdhury, M. S. (2017, March). Compliance with Core International Labor Standards in National Jurisdiction: Evidence from Bangladesh. *Labor Law Journal*, 68(1), 78-93.

Clarke, V., & Braun, V. (2018). Using thematic analysis in counselling and psychotherapy research: A critical reflection. *Counselling and Psychotherapy Research, 18*(2), 107-110.

Clarke, V., Hayfield, N., Moller, N., & Tischner, I. (2017). Once Upon A Time…: Story Completion Methods. In V. Braun, V. Clarke, & D. Gray (Eds.), *Collecting Qualitative Data: A Practical Guide to Textual, Media and Virtual Techniques* (1st ed., pp. 45–70.). Cambridge, England: Cambridge University Press.

Coffman, J. A. (2011). On Causality in Nonlinear Complex Systems: The Developmentalist Perspective. In C. Hooker (Ed.), *Handbook of the Philosophy of Science* (Vol. 10, pp. 287-310). Amsterdam, Holland: North Holland (Elsevier BV) .

Coglianese, C. (2010). Engaging Business in the Regulation of Nanotechnology . In C. Bosso (Ed.), *Governing Uncertainty: Environmental Regulation in the Age of Nanotechnology* (1st ed., pp. 46-80). London: RFF Press.

Cohen, L., Manion, L., & Morrison, K. (2018). *Research Methods in Education* (8th ed.). New York, NY, USA: Routledge.

Cole, G. A. (2004). *Management Theory and Practice* (6th ed.). London, UK: South-Western Cencage Learning.

Collins, C. S., & Stockton, C. M. (2018). The Central Role of Theory in Qualitative Research. *International Journal of Qualitative Methods, 17*, 1-10.

Conchie, S. M., Moon, S., & Duncan, M. (2013). Supervisors' engagement in safety leadership: Factors that help and hinder. *Safety Science, 51*, 109–117.

Cope, D. G. (2014). Computer-Assisted Qualitative Data Analysis Software. *Oncology Nursing Forum, 41*(3), 322-323.

Coze, J. C. (2019). Safety as strategy: Mistakes, failures and fascos in high-risk systems. *Safety Science, 116*, 259–274.

Coze, J.-C. L. (2013). New models for new times. An anti-dualist move. *Safety Science, 59*, 200-218.

Creswell, J. W. (2018). *Educational Research: Planning, Conducting, and Evaluating Quantitative and Qualitative Research* (5th ed.). Pearson.

Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th ed.). Thousand Oaks, California, , United States: Sage Publications.

Creswell, J. W., & Poth, C. N. (2018). *Qualitative Inquiry and Research Design: Choosing Among Five Approaches* (4th ed.). Thousand Oaks, CA, USA: Sage Publications.

Cummings, T. G., & Worley, C. G. (2015). *Organization Development and Change* (10th ed.). Stanford, CT, USA: Cengage Learning.

Daft, R. L. (2016). *Organization theory & design* (12th ed.). Mason, Ohio, USA: South-Western Cengage Learning.

Daft, R. L., & Marcic, D. (2017). *Understanding Management* (10th ed.). Mason, OH, USA: South-Western Cengage Learning.

Dahl, Ø., & Kongsvik, T. (2018). Safety climate and mindful safety practices in the oil and gas industry. *Journal of Safety Research, 64*, 29-36.

Dahlstorm, D. L., & Snawder, J. E. (2014). Solvents and Industrial Hygene. In A. W. Hayes, & C. L. Kruger (Eds.), *Hayes' Principles and Methods of Toxicology* (6th ed., pp. 677-710). Boca Raton, FL, USA: CRC Press.

Dammann, O., & Smart, B. (2019). *Causation in Population Health Informatics and Data Science* (1st ed.). Cham, Switzerland: Springer Nature.

Daniel, A. (2010). *Perception Gaps between Headquarters and Subsidiary ManagersDiffering Perspectives on Subsidiary Roles and their Implications*. Berlin, Germany: Springer.

Daudigeos, T., Jaumier, S., & Boutinot, A. (2017). Governing workplace safety through apparatuses: A historical study of the French construction industry in the 20th century. *Organization, 24*(6), 737-760.

Dekker, S. (2011). *Drift into failure : from hunting broken components to understanding complex systems*. Surrey , England: Ashgate Publishing Limited.

Dekker, S. (2014). *The Field Guide to understanding 'human error'* (3rd ed.). Surrey, England: Ashgate.

Dekker, S. (2014a). The bureaucratization of safety. *Safety Science, 70*, 348–357.

Dekker, S. (2015). *Safety Differently: Human Factors for a New Era* (2nd ed.). Boca Raton, FL, USA: CRC Press.

Dekker, S., & Pitzer, C. (2016). Examining the asymptote in safety progress: a literature review. *International Journal of Occupational Safety and Ergonomics, 22*(1), 57-65.

Dekkers, R. (2017). *Applied Systems Theory* (2nd ed.). New York: Springer .

Dennhardt, S., & Rudman, D. L. (2012). When occupation goes 'wrong': A critical reflection on risk discourses and their relevance in shaping occupation. In G. Whiteford, & C. Hocking (Eds.), *Occupational Science: Society, Inclusion, Participation* (1st ed., pp. 117-136). Hoboken, NJ, USA: Blackwell Publishing Ltd.

Deshingkar, P., Abrar, C. R., Sultana, M. T., Haque, K. N., & Reza, M. S. (2019). Producing ideal Bangladeshi migrants for precarious construction work in Qatar. *Journal of Ethnic and Migration Studies*, 2019, 2723-2738. https://doi.org/10.1080/1369183X.2018.1528104

Dewan, S., & Sarkar, U. (2017). *From Education to Employability:A Case Study of Bangladesh.* Kathmandu: JustJobs Network Inc. and UNICEF Regional Office for South Asia (ROSA).

Dey, I. (2005). *Qualitative data analysis: A user-friendly guide for social scientists* (1st ed.). London: Routledge (Taylor & Francis Group).

Dhillon, B. (2018). *Safety, Reliability, Human Factors, and Human Error in Nuclear Power Plants* (1st ed.). Boca Raton, FL, USA: CRC Press.

Dijk, F. J., Bubas, M., & Smits, P. B. (2015). Evaluation Studies on Education in Occupational Safety and Health: Inspiration for Developing Economies. *Annals of Global Health, 81*(4), 548-560.

Dima, I. C., & Man, M. (2015). *Modelling and Simulation in Management Econometric Models Used in the Management of Organizations.* Cham, Switzerland : Springer International Publishing.

Dine, C. J., McGaghie, W. C., Bordage, G., & Shea, J. A. (2015). Problem Statement, Conceptual Framework, and Research Question. In S. J. Durning, & J. D. Carline (Eds.), *Review Criteria for Research Manuscripts* (2nd ed., Vol. Part 2, pp. 19-21). Washington DC: Association of American Medical Colleges.

Dodson, D. W. (2016). *Fire Department Incident Safety Officer* (3rd ed.). Burlington, MA, USA: Jones and Bartlett Learning.

Dolgui, A., & Proth, J.-M. (2010). *Supply Chain Engineering: Useful Methods and Techniques* (1st ed.). London, England: Springer Verlag.

Donaghy, R. (2009). *One death is too many: inquiry into the underlying causes of construction.* London, UK: Controller of Her Majesty's Stationery Office.

DOSH. (2018). *http://www.dosh.gov.my*. Retrieved 07 29, 2018, from Department of Occupational Safety and Health (DOSH), Malaysia: http://www.dosh.gov.my/index.php/en/national-occupational-accident-fatality-rate

Dougherty, A. M. (2014). *Psychological Consultation and Collaboration in School and Community Settings* (6th ed.). Boston , MA, USA: Cengage Learning.

Drisko, J. W. (2013). Qualitative data analysis software: an overview and new possibilities. In A. E. Fortune, W. J. Reid, & R. L. Jr. (Eds.), *Qualitative Research in Social Work* (2nd ed., pp. 284-306). New York, NY, USA: Columbia University Press.

Duell, N., Steinberg, L., Icenogle, G., Chein, J., Chaudhary, N., Giunta, L., Dodge, K. A., Fanti K. A., Lansford J. E., Oburu P., Pastorelli C., Skinner A. T., Sorbring E., Tapanya S., Uribe Tirado L. M., Alampay L. P., Al-Hassan S. M., Takash H. M. S., Bacchini D., & Chang L.

(2018). Age Patterns in Risk Taking Across the World. *Journal of Youth Adolescence, 47*(5), 1052-1072.

Duffey, R. B., & Saull, J. W. (2008). *Managing risk : the human element* . West Sussex, UK: John Wiley & Sons Ltd.

Duffield, S., & Whitty, J. (2015). Developing a systemic lessons learned knowledge model for organisational learning through projects. *International Journal of Project Management, 33*(2), 311-324.

Dul, J., & Hak, T. (2015). *Case study methodology in business research* (1st ed.). London: Routledge.

Durdyev, S., Mohamed, S., Lay, M. L., & Ismail, S. (2017). Key Factors Affecting Construction Safety Performance in Developing Countries:Evidence from Cambodia. *Construction Economics and Building, 17*(4), 48-65.

Dutta, M. J. (2017, 01 29). Migration and Health in the Construction Industry: Culturally Centering Voices of Bangladeshi Workers in Singapore. *International Journal of Environmental Research and Public Health, 14*(2), 1-14.

Dutta, P., Rajiva, A., Andhare, D., Azhar, G. S., Tiwari, A., Sheffield, P., et al. (2015). Perceived heat stress and health effects on construction workers. *Indian Journal of Occupational and Environmental Medicine, 19*(3), 151–158.

Easterby-Smith, M., Thorpe, R., & Jackson, P. (2012). *Management Research* (4th ed.). London: Sage Publications.

Edmonds, W. A., & Kennedy, T. D. (2017). *An Applied Guideto Research DesignsQuantitative, Qualitative, and Mixed Methods* (2nd ed.). Los Angeles: Sage Publications.

Eisenberg, A., Davidova, J., & Kokina, I. (2018). The interrelation between organizational learning culture and organizational citizenship behavior. *Rural environment, education, personality, 11*, 354-363.

Elmore, R. F. (2013). Organizational models of social program implementation. In M. Hill (Ed), *Policy Process: A Reader* (2nd ed., pp. 241-281). New York, NY, USA: Routledge.

Elwell, F. W. (2013). *Sociocultural Systems: Principles of Structure and Change* (1st ed.). Edmonton, Canada : Athabaska University Press.

Esgate, A., Groome, D., Baker, K., Maguire, M., & Reed, C. (2005). *An Introduction to Applied Cognitive Psychology*. New York, NY, USA: Psychology Press.

Eshetu, G. (2014). *Stories of Changes from Open Diaries: The Joint Effects of Radio Messaging and Group Discussions to Fight Child Marriage* (1st ed.). Hamburg, Germany: Anchor Academic Publishing.

Eskandari, D., Jafari, M. J., & Yadollah Mehrabi, M. P. (2017). A Qualitative Study on Organizational Factors Affecting Occupational Accidents. *Iranian Journal of Public Health, 46*(3), 380-388.

Fan, D., & Zhou, Y. (2018). Operational safety: The hidden cost of supply-demand mismatch in fashion and textiles related manufacturers. *International Journal of Production Economics, 198*, 70-78.

Fang, D., Wu, C., & Wu, H. (2015). Impact of the Supervisor on Worker Safety Behavior in Construction Projects. *Journal of management in engineering, 31*(6), 04015001-1-12.

Feng, Y. (2013). Effect of safety investments on safety performance of building projects. *Safety Science, 59* (2013), 28–45.

Fielding, N., & Lee, R. (1998). *Computer Analysis and Qualitative Research,* (1st ed.). London, England: Sage Publications.

Fiorentini, L., & Marmo, L. (2019). *Principles of Forensic Engineering Applied to Industrial Accidents* (1st ed.). New York, NY, USA: John Wiley and Sons Ltd.

Fischer, F. M. (2010). *The Application of the Controllability Principle and Managers' Responses: A Role Theory Perspective* (1st ed.). Heidelberg, Germany: Gabler Verlag -Springer GMBH.

Fisher, M. (2017). *Qualitative Computing: Using Software for Qualitative Data Analysis* (1st ed.). London , England: Routledge.

Fleet, D. V., Fleet, E. V., & Seperich, G. J. (2014). *Agribusiness: Principles of Management* (1st ed.). Clifton Park, NY, USA: Delmar Cencage Learning.

Flick, U. (2014). Mapping the Field. In U. Flick (Ed.), *The SAGE Handbook of Qualitative Data Analysis* (pp. 3-18). Thousand Oaks, CA, USA: Sage Publications.

Flynn, M. A., Castellanos, E., & Flores-Andrade, A. (2018, January). Safety across cultures: understanding the challenges. *Professional safety*.

Forck, F., & Noakes-Fry, K. (2016). *Cause Analysis Manual: Incident Investigation Method & Techniques.* Brookfield: Rothstein Publishing.

Freeman, L., & Sullivan, C. (2019). Thematic analysis. In C. Sullivan, & M. A. Forrester (Eds.), *Doing Qualitative Research in Psychology: A Practical Guide* (2nd ed., pp. 161-179). London, England: Sage Publications.

Freeman, M. (2017). *Modes of Thinking for Qualitative Data Analysis* (1st ed.). New York: Routledge.

Friend, M. A., & Kohn, J. P. (2018). *Fundamentals of Occupational Safety and Health* (7th ed.). Lanham, Maryland, USA: Bernan Press .

Frost, D. M. (2019). Narrative Approaches within a Social Psychology of Social Justice: The Potential Utility of Narrative Evidence. In P. L. Jr. (Ed.), *The Oxford Handbook of Social Psychology and Social Justice* (1st ed., pp. 83-96). New York, NY, USA: Oxford University Press.

Fruhen, L., Mearns, K., Flin, R., & Kirwan, B. (2014). Skills, knowledge and senior managers' demonstrations of safety commitment. *Safety Science, 69*, 29-35.

Fugarda, A. J., & Potts, H. W. (2015). Supporting thinking on sample sizes for thematic analyses: a quantitative tool. *International Journal of Social Research Methodology*, 2014, 1-16. https://doi.org/10.1080/13645579.2015.1005453

Gabriel, Y. (2019). Narratives and Stories in Organizational Life. In A. D. Fina, & A. Georgakopoulou (Eds.), *The Handbook of Narrative Analysis* (1st ed., pp. 275-292). Hoboken , NJ, USA: Willey Blackwell.

Gaffney, A. M., & Hogg, M. A. (2017). Social Identity and Social Influence. In S. G. Harkins, .D . Williams & ,J .M .Burger)Eds(., *The Oxford Handbook of Social Influence* (pp. 259-282). New York, NY, USA: Oxford University Press.

Gao, Y., Fan, Y., Wang, J., & Duan, Z. (2019). Evaluation of governmental safety regulatory functions in preventing majoraccidents in China. *Safety Science, 120,* 299-311. doi:https://doi.org/10.1016/j.ssci.2019.07.002

Garnica, G. B., & Barriga, G. D. (2018). Barriers to occupational health and safety management in small Brazilian enterprises. *Production, 28,* 1-10.

Geels, F. W. (2005). *Technological Transitions and System Innovations: A Co-evolutionary and Socio-Technical Analysis* (1st ed.). Chentenham, UK: Edward Elgar.

Gibb, A., Lingard, H., Behm, M., & Cooke, T. (2014). Construction accident causality: learning from different countries and differing consequences. *Construction Management and Economics, 32*(5), 446-459 .

Gilpin, D. R., & Murphy, P. J. (2008). *Crisis management in a complex world* (1st ed.). Oxford, NY, USA: Oxford University Press Inc.

Glendon, A. I., & Clarke, S. G. (2016). *Human Safety and Risk Management: A Psychological Perspective* (3rd ed.). Boca Raton, FL, USA: CRC Press.

Gliner, J. A., Morgan, G. A., & Leech, N. L. (2017). *Research methods in applied settings : an integrated approach todesign and analysis* . New York: Taylor & Francis.

Gobo, G. (2007). Sampling, Representativeness and Generalizability. In C. Seale, D. Silverman, J. F. Gubrium, & G. Gobo (Eds.), *Qualitative Research Practice* (pp. 405–426.). Thousand Oaks, CA, USA: Sage Publications.

Gomes, H. P., Arezes, P. M., & Vasconcellos, L. C. (2016). A qualitative analysis on occupational health and safety conditions in the Brazilian construction sector. *DYNA :Journal of the Faculty of Mines, National University of Colombia), 83*(196), 39-47.

Gonçalves, P., Sobral, J., & Ferreira, L. (2017). Development of unmanned aerial vehicles maintenance strategy under an asset management framework. In L. Walls, M. Revie, & T. Bedford (Eds.), *Risk, Reliability and Safety: Innovating Theory and Practice* (pp. 1031-1037). CRC Press.

Górny, A. (2017). Identification of occupational accident causes by use the Ishikawa diagram and Pareto principles. *3rd International Conference on Economics and Management Innovations (ICEMI).* (1st ed., pp. 384-388). Bangkok: Volkson Press.

Government of Bangladesh. (2010). *Bangladesh Gazette: annexe (October5, 2010): Real Estate Development and Management Act 2010.* Dhaka: Bangladesh Government Press (Department of Printing and Publication).

Government of Malaysia. (2015). *Laws of Malaysia : Act 520 Lembaga Pembangunan Industri Pembinaan Malaysia Act 1994.* Kualalumpur: Percetakan Nasional Malaysia Berhad (PNMB).

Grady, C., Cumming, S. R., Rowbotham, M. C., McConnell, M. V., Ashley, E. A., & Kang, G. (2017). Informed Consent. *The new england journal of medicine, 376*(9), 856-867.

Grant, E., Salmon, P. M., & Stevens, N. J. (2018a, November). The usual suspects? A novel extension to AcciMap using accident causation model tenets. *Theoretical Issues in Ergonomics Science*, 2018, 397-418. https://doi.org/10.1080/1463922X.2018.1510061.

Grant, E., Salmon, P. M., Stevens, N. J., Goode, N., & Read, G. J. (2018). Back to the future: What do accident causation models tell us about accident. *Safety Science, 104*, 99–109.

Gravina, N., Cummins, B., & Austin, J. (2017). Leadership's Role in Process Safety: An Understanding of Behavioral Science Among Managers and Executives Is Needed. *Journal Journal of Organizational Behavior Management, 2017, 37*(3-4), 316–33.

Gray, D. E. (2018). *Doing Research in the Real World* (4th ed.). Thousand Oaks , CA, USA: Sage Publications.

Greco, T., Zangrillo, A., Biondi-Zoccai, G., & Landoni, G. (2013). Meta-analysis: pitfalls and hints. *Heart, Lung and Vessel, 5*(4), 219–225.

Greenwood, M., & Woods, H. M. (1919). *The incidence of industrial accidents upon individuals, with special reference to multiple accidents.* Industrial Fatigue Research Board, Medical Research Committee. London: Her Majesty's Stationery Ofice.

Griffin, T. G., Young, M. S., & Stanton, N. A. (2015). *Human factors models for aviation accident analysis and prevention.* Surrey, England: Ashgate.

Guo, B. H., Goh, Y. M., & Wong, K. L. (2018). A system dynamics view of a behavior-based safety program in the construction industry. *Safety Science, 104*, 202–215.

Guo, B. H., Yiu, T. W., & González, V. A. (2015). Identifying behaviour patterns of construction safety using system archetypes. *Accident Analysis and Prevention, 80*, 125–141.

Guo, B. H., Yiu, T. W., & González, V. A. (2016). Predicting safety behavior in the construction industry: Development and test of an integrative model. *Safety Science, 84*, 1-11.

Guo, B. H., Yiu, T. W., & A.González, V. (2018a). Does company size matter? Validation of an integrative model of safety2behavior across small and large construction companies. *Journal of Safety Research, 64*, 73-81.

Gupta, P. (2017). Eastern Housing Limited—Marketing Strategies of Real Estate Company in Bangladesh. *Vision, 21*(1), 97–100.

Habibnezhad, M., & Esmaeili, B. (2016). The Influence of Individual Cultural Values on Construction Workers' Risk Perception. *52nd ASC Annual International Conference Proceedings* (p. Unknown). Provo: Associated Schools of Construction.

Hadi, M. A., & Closs, J. (2016). Ensuring rigour and trustworthiness of qualitative research in clinical pharmacy. *International Journal of Clinical Pharmacy, 38*(3), 641–646.

Halcomb, E. J., & Davidson, P. M. (2006). Is verbatim transcription of interview data always necessary? *Applied Nursing Research, 19*, 38–42.

Hald, K. S. (2018). Social influence and safe behavior in manufacturing. *Safety Science, 109*, 1–11.

Hale, A., Borys, D., & Adams, M. (2015). Safety regulation: The lessons of workplace safety rule managementfor managing the regulatory burden. *Safety Science, 71*, 112-122.

Hallowell, M. R., & Yugar-Arias, I. F. (2016). Exploring fundamental causes of safety challenges faced by Hispanic construction workers in the US using photovoice. *Safety Science, 82*, 199-211.

Hammond, D. (2010). *The science of synthesis : exploring the social implications of general systems theory* (1st ed.). Boulder, Colorado, USA: University Press of Colorado.

Hammond, M., & Wellington, J. J. (2013). *Research Methods: The Key Concepts* (1st ed.). London, England: Routledge.

Hansez, I., & Chmiel, N. (2010). Safety behavior: Job demands, job resources, and perceived management commitment to safety. *Journal of Occupational Health Psychology, 15*(3), 267-78.

Haque, S. T., & Mohammad, S. N. (2015). Administrative Culture and Incidence of Corruption in Bangladesh: A Search for the Potential Linkage. In I. Jamil, S. Askvik, & F. Hossain (Eds.), *Administrative Culture in Developing and Transitional Countries* (1st ed.) pp. 100-110. New York, NY, USA: Routledge.

Harris, T. E., & Nelson, M. D. (2008). *Applied Organizational Communication:theory and practice in a global environment* (3rd ed.). New York, NY, USA: Taylor & Francis Group.

Harvey, E. J., Waterson, P., & Dainty, A. R. (2018). Beyond ConCA: Rethinking causality and construction accidents. *Applied Ergonomics, 73,* 108–121.

Harvey, E., Waterson, P., & Dainty, A. (2016). Towards an alternative approach to safety in construction. In P. Waterson, R. Sims, & E.-M. Hubbard (Eds.), *Contemporary Ergonomics and Human Factors.* Daventry : Chartered Institute of Ergonomics & Human Factors.

Harvey, E., Waterson, P., & Dainty, A. (2019). Impact of the 'Contributing Factors in Construction Accidents' (ConCA) Model. In S. Bagnara, R. Tartaglia, S. Albolino, T. Alexander, & Y. Fujita (Eds.), *Proceedings of the 20th Congress of the International Ergonomics Association (IEA 2018). 824.* Cham: Springer Nature Switzerland AG.

Hasan, M. M., Khanam, R., Zaman, A. K., & Ibrahim, M. (2017). Occupational Health and Safety Status of Ongoing Construction Work in Patuakhali Science and Technology University, Dumki, Patuakhali. *Journal of Health and Environmental Research, 3*(5), 72-83.

Haslam, S. A., & McGarty, C. (2019). *Research Methods and Statistics in Psychology* (3rd ed.). London, England: Sage Publications.

HBSI. (2015). *Bangladesh National Building Code.* Dhaka: Housing and Building Research Institute (HBSI).

Health and Safety Executives . (2010, 3 18). *Individual factors*. Retrieved from Health and Safety Executives, Government of UK, : http://www.hse.gov.uk/humanfactors/individual.htm

Hearle, C. (2016). *Skills, employment and productivity in the garments and construction sectors in Bangladesh and elsewhere.* Oxford: Oxford Policy Management.

Heffernan, C., Harries, J., & Kirby, N. (2018). Theoretical Components of Workplace Safety Climate and Their Implications for Practice. In M. T. Leung, & L. M. Tan (Eds), *Applied Psychology Readings* (pp. 217-237). Singapore: Springer Nature Singapore Pte Ltd.

Heinrich, H. (1931). *Industrial accident prevention.* New York: McGraw Hill.

Hill, C. A. (2011). *An Introduction to Sustainable Resource Use* (1st ed.). New York, NY, USA: Earthscan.

Hill, M. E. (2013). *Marketing Strategy: The Thinking Involved* (1st ed.). New Delhi, India: Sage India.

Hoá, B., & Szóstak, M. (2014). Analysis of the Development of Accident Situations in the Construction Industry. *Procedia Engineering, 91*, 429 – 434.

Hocking, C. (2014). Contribution of occupation to health and well-being. In B. A. Schell, G. Gillen, Marjorie Scaffa, & E. Cohn (Ed.), *Willard and Spackman's Occupational Therapy* (12th ed., pp. 72-81). Baltimore , MD, USA: Lippincott Williams and Wilkins.

Hoffmann, R., Lerner, N., Critchley, S., & Cislo, G. (2018). Human Performance and Safety Culture Initiatives Transform Safety. *Society for Petroleum Engineering Journal, 2018*, 1-7. https://doi.org/10.2118/190563-MS

Hofmann, D. A., & Burke, M. J. (2017). 100 Years of Occupational Safety Research: From Basic Protections andWork Analysis to a Multilevel View of Workplace Safety and Risk. *Journal of Applied Psychology, 102*(1), 375–388.

Hoła, A., Sawicki, M., & Szóstak, M. (2018). Methodology of Classifying the Causes of Occupational Accidents Involving Construction Scaffolding Using Pareto-Lorenz Analysis. *Appled. Science. 8*(1), 1-11. https://doi.org/10.3390/app8010048

Hoła, B., Nowobilski, T., Szer, I., & Szer, J. (2017). Identification of factors affecting the accident rate in the construction industry. *Procedia Engineering, 208*, 35–42.

Hollnagel, E. (2014). *Safety-I and Safety–II: The Past and Future of Safety Management* (1 ed.). Surrey: Ashgate Publishing Limited.

Holloway, I., & Galvin, K. (2017). *Qualitative Research in Nursing and Healthcare* (4th ed.). Chichester, UK: Wiley-Blackwell.

Hom, P. W., Tsui, A. S., Wu, J. B., Lee, T. W., Zhang, A. Y., Fu, P. P., & Li L. (2009). Explaining Employment Relationships With Social Exchange. *Journal of Applied Psychology, 94*(2), 277–297.

Hooker, C. (2011). Introduction to Philosophy of Complex Systems: A. In C. Hooker (Ed.), *Handbook of the of Science* (pp. 3-90). Waltham, MA, USA: Elsevier B.V.

Horberry, T. J., Burgess-Limerick, R., & Steiner, L. J. (2011). *Human Factors for the Design, operation,and Maintenance of Mining Equipment.* Boca Raton, FL, USA: CRC Press.

Høyland, S. A., Skotnes, R. Ø., & Holte, K. A. (2018). An empirical exploration of the presence of HRO safety principles across the health care sector and construction industry in Norway. *Safety Science, 107*, 161-172.

HSE. (2018). *Annual statistics: Workplace fatal injuries in Great Britain 2018.* London: Health and Safety Executive (HSE).

HSE. (2018a). *Annual Statistics: European Comparisons.* London: Health and Safety Executive (HSE), United Kingdom.

Huang, L., Wu, C., Wang, B., & Ouyang, Q. (2018). A New Paradigm for Accident Investigation and Analysis in the Era of Big Data. *Process Safety Progress, 37*(1), 42-48.

Huang, Y.-H., Verma, S. K., Chang, W.-R., & Courtney, T. K. (2012). Management commitment to safety vs. employee perceived safety training and association with future injury. *Accident Analysis and Prevention, 47*, 94-101.

Huanga, S. (., & Crotts, J. (2019). Relationships between Hofstede's cultural dimensions and tourist satisfaction: A cross-country cross-sample examination. *Tourism Management, 72*, 232–241.

Hudson, P. (2014). Accident causation models, management and the law. *Journal of Risk Research, 17*(6), 749–764.

Hudson, P., & Hudson, T. (2015). Integrating Cultural and Regulatory Factors in the Bowtie: Moving from Hand-Waving to Rigor. In V. Ebrahimipour, & S. Yacout (Eds.), *Ontology Modeling in Physical Asset Integrity Management* (1st ed., pp. 171-198). Dordrecht, Switzerland: Springer .

Hughes, P., & Ferrett, E. (2013). *International Health and Safety at Work: For the NEBOSH International General Certificate* (2nd ed.). London, UK: Routledge.

Husain, M. M., & Osswald, K. (2016). Zombie graduates driven by rickshaw faculty – a qualitative case study: Private universities in urban Bangladesh. *Policy Futures in Education, 14*(7), 1-16.

ILO. (2017, 4 28). *Safety and health at work in Bangladesh*. Retrieved 1 6, 2019, from ILO in Bangladesh : https://www.ilo.org/dhaka/Areasofwork/safety-and-health-at-work/lang--en/index.htm

Islam, M. S., & Suhariadi, B. T. (2018). Construction delays in privately funded large building projects in Bangladesh. *Asian Journal of Civil Engineering, 19*(4), 415–429.

Islam, M. S., & Trigunarsyah, B. (2017). Construction Delays in Developing Countries:A Review. *Journal of Construction Engineering and Project Management, 7*(1), 1-10.

Islam, M. S., Razwanul, I., & Mahmud, M. T. (2017). Safety Practices and Causes of Fatality in Building Construction Projects:A Case Study for Bangladesh. *Jordan Journal of Civil Engineering, 11*(2), 2017.

Islam, M. T., Siddeqa, M., & Biswas, A. A. (2018). Smallholder Farmer's Knowledge, Perception and Attitude on Occupational Hazard and Safety at Dumki Sub-District of Bangladesh. *Journal of Sociology and Anthropology, 2*(1), 21-26.

Jackson, B. J. (2010). *Construction Management JumpStart* (2nd ed.). San Francisco, CA, USA: Sybex Inc.

Jackson, M. C. (1991). *Systems methodology for the management sciences.* New York: Springer Science and Business Media.

Jacobs, D. E., & Forst, L. (2017). Occupational Safety and Health and Healthy Housing:A Review of Opportunities and Challenges. *Journal of Public Health Management Practices, 23*(6), e36-e45.

Jaffe, K. (2014). The Relevance of Science in Development: Scientific Development Favors Economic Prosperity, but Not Necessarily through its Effect on Technological Knowledge in Middle Income Countries (. In B. Christiansen, & M. Basilgan (Eds.), *Economic Behavior, Game Theory, and Technology in Emerging Markets* (pp. 1-7). Hershey, PA, USA: IGI Global.

Jain, A., Leka, S., & Zwetsloot, G. I. (2018). *Aligning Perspectives on Health, Safety and Well-Being: Ethics, Responsibility and Sustainability* (1st ed.). Dordrecht, Netherlands: Springer Nature.

Jamil, M. A., Hossain, A., & Siddique, M. Z. (2018). Factors Influencing Consumers' Choice Criteria to Purchase Residential Apartments in Bangladesh. *International Journal of Science and Business, 2*(3), 294-305.

Johnson, B., & Christensen, L. (2012). *Educational Research: Quantitative, Qualitative, and Mixed Approaches* (4th ed.). Thousand Oaks, CA, USA: Sage Publications.

Johnson, R. B., & Christensen, L. (2014). *Educational research: Quantitative, qualitative, and mixed approaches* (5th ed.). Los Angeles: Sage Publications.

Jones, G. R. (2013). *Organizational Theory, Design, and Change;*. Harlow, Essex, England: Pearson Education Limited.

Jong, M. d., Henry, W. P., & Stansbury, N. (2009). Eliminating Corruption in Our Engineering/Construction Industry. *Leadership and Management in Engineering, 9*(3), 105-111.

Jurkiewicz, C. L., & Giacalone, R. A. (2016). Organizational Determinants of Ethical Dysfunctionality. *Journal of Business Ethics, 136*, 1-12.

Kaba, A., & Beran, T. (2014). Twelve tips to guide effective participant recruitment for interprofessional education research. *Medical Teacher, 36*(7), 578-84.

Kadushin, A., & Kadushin,) .2013 .(*The Social Work Interview* (5th ed.). New York, NY, USA: Columbia University Press.

Kamal, D. M., & Pramanik, S. A. (2015a). Factors Affecting Customers to Buy Apartments in Dhaka City. *European Journal of Business and Management, 7*(35), 45-58.

Kamal, D. M., Sarker, D. M., & Pramanik, S. A. (2016). Investigation of Market Factors That Affect Customers' Buying Attitude towards Apartment Buying: An Opportunity Analysis from Bangladesh Perspective. *International Journal of Business Administration, 7*(3), 153-165.

Kamal, E. M., & Flanagan, R. (2014). Key Characteristics of Rural Construction SMEs. *Journal of Construction in Developing Countries, 19*(2), 1–13.

Kamal, M., & Pramanik, S. A. (2015). Factors Affecting Customers to Buy Apartments in Dhaka City. *Daffodil International University Journal of Business and Economics, 9*(2), 37-49.

Kamalnataraj, D., & Ramasamy, V. (2015). Construction Accidents –Indian Scenario. In G. Ranganath, & S. Babu (Eds.), *International Conference on Infrastructure Development for Environmental Conservation and Sustenance (INDECS-15)* (pp. 194-199). Hosur: Department of Civil Engineering, Adhiyamaan College Of Engineering, India.

Kao, P. L., & Scott, W. (2014). Low-Achieving Language Learners in Self-Directed Multimedia Environments: Transforming Understanding. In J.-B. Son (Ed.), *Computer-Assisted Language Learning: Learners, Teachers and Tools* (1st ed., pp. 1-20). Newcastle upon Tyne, UK: Cambridge Scholar Publishing.

Katz, D., & Kahn, L. R. (1978). *The Social Psychology of Organizations* (2nd ed.). New York, NY, USA: John Wiley & Sons, Inc.

Kayser, S. A. (2018). Negative Relationship Between Event-Specific Corporate Social Responsibility and Shareholder Value. In F. Briscoe, B. King, & J. Leitzinger (Eds.), *Social Movements, Stakeholders and Non-Market Strategy* (pp. 143 - 171). Bingley , UK: Emerald Publishing Limited .

Kelly, A. (2006). *Strategic Maintenance Planning* (1st ed.). London: Elsevier Ltd.

Kenett, R. S., & Raanan, Y. (2011). Operational risks, quality, accidents and incidents. In R. S. Kenett, & Y. Raanan (Eds.), *Operational Risk Management: A Practical Approach to Intelligent Data Analysis* (1st ed. pp. 253–279). New York, NY, USA: John Wiley and Sons .

Kerzner, H. (2017). *Project Management: A Systems Approach to Planning, Scheduling, and Controlling* (12th ed.). Hoboken, NJ, USA: John Wiley & Sons Inc.

Khan, M. A., & Milne, G. (2018). Global governance, neoliberalism and national responses:The case of the Bangladesh's ready-made garment (RMG) sector. *Development Policy Review, 37(S2)*, O230-O247. https://doi.org/10.1111/dpr.12383.

Khan, N. H., Ghazali, Z. b., & Isha, A. S. (2014). The role of leadership and leaders' behavioral haracteristics on employees' safety behavior in plant turnaround maintenance of PETRONAS petrochemical companies in Malaysia. *Global Business and Management Research: An International Journal, 6*(3), 256-261.

Khan, R. A., Liew, M. S., & Ghazali, Z. B. (2014). Malaysian Construction Sector and Malaysia Vision 2020:. *Procedia - Social and Behavioral Sciences, 109*, 507 – 513.

Khan, S. I., Bartram, T., Cavanagh, J., Hossain, M. S., & Akter, S. (2018). “Decent work” in the ready-made garment sector in Bangladesh The role for ethical human resource management, trade unions and situated moral agency. *Personnel Review, 48(1),* 40-55.

Khan, S., & Swapan, M. S. (2013). From blueprint master plans to democratic planning in South Asian cities: Pursuing good governance agenda against prevalent patroneclient networks. *Habitat International, 38*, 183-191.

Khare, H. S., & Kader, A. W. (2016). *Barriers Constraining the Low and Middle Income Housing Finance Market in Bangladesh 2016.* Washington DC: International Finance Corporation , World Bank group.

Khosravi, Y., Asilian-Mahabadi, H., Hajizadeh, E., Hassanzadeh-Rangi, N., Bastani, H., & Behzadan, A. H. (2014). Factors Influencing Unsafe Behaviors and Accidents on Construction Sites: A Review. *International Journal of Occupational Safety and Ergonomics, 20*, 3–17.

Kim, J., Park, S. Y., & You, J. (2017). Strategic Leadership for Organizational Learning:A Multi-Level Approach. In *Encyclopedia of Strategic Leadership and Management* (pp. 1521-1534). Hershey , PA, USA: IGI Global.

Kim, J.-H. (2016). *Understanding Narrative Inquiry: The Crafting and Analysis of Stories as Research* (1st ed.). Thousand Oaks, CA, USA: Sage Publications.

King, N., & Horrocks, C. (2010). *Interviews in Qualitative Research* (1st ed.). Thousand Oak, CA, USA: Sage Publications.

King, N., Brooks, J., & Tabari, S. (2018). Template Analysis in Business and Management Research. In M. Ciesielska, & D. Jemielniak (Eds.), *Qualitative Methodologies in Organization Studies* (1st ed., Vol. II, pp. 179-206). Cham, Switzerland: Palgrave Macmillan.

Kiyimba, N., & O’Reilly, M. (2016). The risk of secondary traumatic stress in the qualitative transcription process: a research note. *Qualitative Research, 16*(4), 468-476 .

Kiyimba, N., Lester, J. N., & O'Reilly, M. (2019). *Using Naturally Occurring Data in Qualitative Health Research: A Practical Guide* (1st ed.). Cham, Switzerland: Springer international Publishing AG.

Kleiner, B. M., Hettinger, L. J., DeJoy, D. M., Huang, Y.-H., & Love, P. E. (2015). Sociotechnical attributes of safe and unsafe work systems. *Ergonomics, 58*(4), 635–649.

Knowles, T. (2002). *Food Safety in the Hospitality Industry.* New York, NY, USA: Routledge.

Koch, L., Niesz, T., & Wilkins, M. J. (2018). Qualitative Research Designs. In P. D. Jr., & J. L. Bellini, *Research in Rehabilitation Counseling: A Guide to Design, Methodology, and Utilization* (3rd ed., pp. 186-227). Springfield, IL, USA: Charles C. Thomas Publisher.

Kowal, S., & O'Connell, D. C. (2014). Transcription as a Crucial Step of Data Analysis. In U. Flick (Ed.), *The SAGE handbook of qualitative data analysis* (pp. 64-78). Thousand Oaks, CA, USA: Sage Publications.

Krepon, M. (2009). *Better Safe Than Sorry: The Ironies of Living with the Bomb.* Stanford, CA, USA: Stanford University Press.

Kumar, R. (2014). *Research Methodology: A Step-by-Step Guide for Beginners* (4th ed.). London: Sage Publications.

Łaszek, J. (2016). Monopolistic Competition and Price Discrimination as a Development Company Strategy in the Primary Housing Market. *Critical Housing Analysis, 3*(2), 1-12.

Łaszek, J., & Olszewski, K. (2015). *The behaviour of housing developers.* Warsaw: Economic Institute.

Lata, L. N. (2017). Migration and Urban Livelihoods: A Translocal Perspective in Dhaka, Bangladesh. In F. Fozdar, & C. Stevens (Eds.), *Australian Sociological Association Conference* (pp. 57-66). Perth: The Australian Sociological Association (TASA).

Leavy, P. (2017). *Research Design : Quantitative, Qualitative, Mixed Methods, Arts-Based, and Community-Based Participatory Research Approaches.* London : Guilford Press.

Leedy, P. D., & Ormrod, J. E. (2016). *Practical Research: Planning and Design* (11th ed.). Essex, England: Pearson Education Ltd.

Lessof, C., & Sturgis, P. (2018). New Kinds of Survey Measurements. In D. L. Vannette, & J. A. Krosnick (Eds.), *The Palgrave Handbook of Survey Research* (pp. 165-173). Springer.

Leveson, N. G. (2011). *Engineering a safer world : systems thinking applied to safety.* Massachusetts, Boston, USA: The MIT Press.

Lewis, H., Dwyer, P., Hodkinson, S., & Waite, L. (2015). Hyper-Precarious Lives: Migrants, Work and Forced Labour in the Global North. *Progress in Human Geography , 39*(5), 580-600.

Liang, H., Lin, K.-Y., Zhang, S., & Su, Y. (2018). The Impact of Coworkers' Safety Violations on an Individual Worker: A Social Contagion Effect within the Construction Crew. *International Journal of Environmental Research and Public Health, 15*, 1-21.

Liao, P.-C., Guo, Z., Wang, T., Wen, J., & Tsai, C. H. (2018). Interdependency of Construction Safety Hazards from a Network Perspective: A Mechanical Installation Case. *International Journal of Occupational Safety and Ergnomics*. *2018*, 1-11. https://doi.org/10.1080/10803548.2018.1426272

Lingard, H., & Rowlinson, S. (2005). *Occupational Health and Safety in Construction Project Management* (1st ed.). London, UK: Spon Press.

Liu, H., Jazayeri, E., & Dadi, G. B. (2017). Establishing the Influence of Owner Practices on Construction Safety in an Operational Excellence Model. *Journal of Construction Engineering and Management, 173*(6), 1 to 9.

Liu, J., Meng, F., & Fellows, R. (2015). An exploratory study of understanding project risk management from the perspective of national culture. *International Journal of Project Management, 33*(3), 564-575.

Liu, J., Zhao, X., & Li, a. Y. (2017). Exploring the Factors Inducing Contractors' Unethical Behavior: Case of China. *Journal of Professional Issues in Engineering Education and Practice, 143*(3), 04016023-1-10.

Lohiniva, A. L., Mokhtar, A., Azer, A., Elmoghazy, E., Kamal, E., Benkirane, M., et al. (2016). Qualitative interviews with non-national tuberculosis patients in Cairo, Egypt:

understanding the financial and social cost of treatment adherence. *Health and Social Care in the Community, 24*(6), e164-e172.

Long, S. (2013). *Socioanalytic methods: Discovering the hidden in organisations and social systems.* London: Karnac Books Ltd.

Loosemore, M., & Richard, J. (2015). Valuing innovation in construction and infrastructure Getting clients past a lowest price mentality. *Engineering, Construction and Architectural Management, 22*(1), 38-53.

Lowe, A., Norris, A. C., Farris, A. J., & Babbage, D. R. (2018). Quantifying Thematic Saturation in Qualitative Data Analysis. *Field Methods, 30*(3), 191-207 .

Luo, Y. (2005). An Organizational Perspective of Corruption. *Management and Organization Review, 1*(1), 119–154.

Lupton, D. (2013). *Risk* (2nd ed.). London: Routledge.

Lutz, G., Pankoke, N., Goldblatt, H., Hofmann, M., & Zupanic, M. (2017). Enhancing medical students' reflectivity in mentoring groups for professional development – a qualitative analysis. *BMC(Biomed Central) Medical Education, 17*, 1-12.

Lyon, B. K., & Hollcroft, B. (2016). Defining Risk Assessment Criteria. In G. Popov, B. K. Lyon, & B. Hollcroft (Eds.), *Risk Assessment: A Practical Guide to Assessing Operational Risks* (pp. 67-90). Hoboken , NJ, USA: John Wiley and Sons.

Lyu, S., Hon, C. K., Chan, A. P., Wong, F. K., & Javed, A. A. (2018). Relationships among Safety Climate, Safety Behavior, and Safety Outcomes for Ethnic Minority Construction Workers. *International Journal of Environmental Research and Public Health, 15*(484), 1-16.

Madsen, C. U., & Hasle, P. (2017). Commitment or Compliance? Institutional Logics of Work Environment Management. *Nordic Journal of Working Life Studies, 2*, 17-38.

Madsen, C. U., & Waldorff, S. B. (2019). Between advocacy, compliance and commitment: A multilevel analysis of institutional logics in work environment management. *Scandinavian Journal of Management, 35*, 12–25.

Mahmud, M. A. (2007). *Corruption in Plan Permission Process in RAJUK: A Study of Violations and Proposals.* Dhaka: Transparency International Bangladesh.

Maillard, J. Y. (2013). Editorial – What is the significance and impact of a study? *Letters in Applied Microbiology, 57*(1), 1-1.

Mamun-ur-Rashid, M., & Rhman, M. Z. (2017). Quality of higher education in bangladesh: application of a modified SERVQUAL model. *Problems of Education in the 21st Century, 75*(1), 72-91.

Man, S., Chan, A. H., & Wong, H. (2017). Risk-taking behaviors of Hong Kong construction workers – A thematic study. *Safety Science, 98*, 25-36.

Mannan, S. (2012). *Lees' Loss Prevention in the Process Industries: Hazard Identification Assesment and Control* (4th ed., Vol. 2). Oxford, UK: Butterworth-Heinemann.

Manuele, F. A. (2011). Reviewing Heinrich: Dislodging Two Myths from the Practice of Safety. *Professional Safety, 56(10),* 1-10.

Manuele, F. A. (2013). *On the practice of safety* (4th ed.). Hoboken , New Jersy, USA: John Wiley & Sons.

Marion, R. (1999). *The Edge of Organization: Chaos and Complexity Theories of Formal Social Systems* (1st ed.). Thousand Oaks: Sage Publications.

Markula, P., & Silk, M. (2011). *Qualitative Research for Physical Culture* (1st ed.). London, England: Palgrave Macmillan.

Marshall, C., & Rossman, .B) .2016 .(*Designing Qualitative Research* (6th ed.). Thousand Oaks, California, USA: Sage Publications.

Marshall, P., Hirmas, A., & Singer, M. (2018). Heinrich's pyramid and occupational safety: A statistical validation. *Safety Science*, *101*, 180–189.

Maryani, A., Wignjosoebroto, S., & Partiwi, S. G. (2015). A system dynamics approach for modeling construction accidents. *Procedia Manufacturing, 4*, 392 – 401.

Maxwell, J. A., & Chmiel, M. (2014). Notes Toward a Theory of Qualitative Data Analysis. In U. Flick (Ed.), *The SAGE Handbook of Qualitative Data Analysis* (pp. 21-34). Thousand Oaks, CA, USA: Sage Publications.

McCallum-Ferguson, S., & Forret, M. L. (2018). Career Challenge: Utilizing Networking to Develop Abilities as a Leader. In S. G. Baugh, & S. E. Sullivan (Eds.), *Seeking Challenge in the Career* (pp. 1-22). Charlotte , NC, USA: Information Age Publishing Inc.

McConnell, C., Brue, S., & Macpherson, D. (2017). *Contemporary Labor Economics* (11th ed.). New York, NY, USA: McGraw-Hill Education.

MCKinnon, R. C. (2014). *Changing the Workplace Safety Culture* (1st ed.). New York, New York, USA: CRC Press (Taylor & Francis Group).

McKinnon, R. C. (2019). *Changing Safety's Paradigms* (2nd ed.). Lanham, Maryland, USA: Bernan Press.

McLeod, R. W. (2017). Human Factors in Barrier Management: Hard Truths and Challenges. *Process Safety and Environment Protection, 110*, 31-42.

McSween, T., & Moran, D. J. (2017). Assessing and Preventing Serious Incidents with Behavioral Science: Enhancing Heinrich's Triangle for the 21st Century. *Journal of Organizational Behavior Management, 37*(3-4), 283–300.

Merriam, S. B., & Tisdell, E. J. (2016). *Qualitative research : a guide to design and implementation* (4th ed.). San Francisco, CA, USA: Jossey-Bass.

Meyer, R. M., & O'Brien-Pallas, L. L. (2010). Nursing Services Delivery Theory: an open system approach. *Journal of Advanced Nursing , 66*(12), 2828–2838.

Milch, V., & Laumann, K. (2016). Interorganizational complexity and organizational accident risk: A literature review. *Safety Science, 82*, 9-17.

Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). *Qualitative data analysis: a methods sourcebook* (3 rd ed.). Thousand Oaks, California: Sage Publications.

Miller, K. (2012). *Organizational Communication:Approaches and Processes* (6th ed.). Boston , MA, USA: Wadsworth.

Minami, M. (2019). Narrative, Cognition, and Socialization. In A. D. Fina, & A. Georgakopoulou (Eds.), *The Handbook of Narrative Analysis* (1st ed., pp. 76-96). Hoboken, NJ, USA: Willey Blackwell.

Miner, J. B. (2011). *Organizational Behavior 6: Integrated theory development and the role of the unconscious* (1st ed.). Armonk, NY, USA: M. E. Sharpe Inc.

Mishra, C. S. (2017). *Creating and Sustaining Competitive Advantage: Management Logics, Business Models, and Entrepreneurial Rent* (1st ed.). Cham, Switzerland: Palgrave Macmillan (Springer Nature).

Mitchell, M. L., & Jolley, J. M. (2018). *Research Design Explained* (8th ed.). Belmont, CA, USA: Wadsworth Cengage.

Mogensen, V. (2015). Introduction. In V. Mogensen (Ed.), *Worker Safety Under Siege: Labor, Capital, and the Politics of Workplace Safety in a Deregulated World: Labor, Capital, and the Politics of Workplace Safety in a Deregulated World* (pp. xiii-xxix). London, UK: Routledge.

Mohammadfam, I., Ghasemi, F., Kalatpour, O., & Moghimbeigi, A. (2017). Constructing a Bayesian network model for improving safety behavior of employees at workplaces. *Applied Ergonomics, 58*, 35-47.

Mohammadi, A., Tavakolan, M., & Khosravi, Y. (2018). Factors influencing safety performance on construction projects: A review. *Safety Science, 109*, 382–397.

Molineux, M. (2010). The nature of occupation. In M. Curtin, M. Molineux, & J.A. Webb (Eds.), *Occupational Therapy and Physical Dysfunction: Enabling Occupation* (6th ed., pp. 17-26). London, England: Churchill Livingstone-Elsevier.

Moon, K., Brewer, T. D., Januchowski-Hartley, S. R., Adams, V. M., & Blackman, D. A. (2016). A guideline to improve qualitative social science publishing in ecology and conservation journals. *Ecology and Society, 21*(3), 1-20.

Moore, G. (2013). Re-imagining the Morality of Management: A Modern Virtue Ethics Approach. In H. Harris, G. Wijesinghe, & S. McKenzie (Eds.), *The Heart of the Good Institution:*

Virtue Ethics as a Framework for Responsible Management (pp. 7-34). Dordrecht, Netherlands: Springer .

Morley, F. J., & Harris, D. (2006). Ripples in a Pond: An Open System Model of the Evolution of Safety Culture. *International Journal of Occupational Safety and Ergonomics (JOSE), 12*(1), 3–15.

Morris, A. (2015). *A Practical Introduction to In-depth Interviewing* (1st ed.). London , england: Sage Publications.

Mullen, J., Kelloway, K., & Teed, M. (2017). Employer safety obligations, transformational leadership and their interactive effects on employee safety performance. *Safety Science, 91*, 405–412.

Mulliner, E., & Algrnas, M. (2018). Preferences for housing attributes in Saudi Arabia: A comparison between consumers' and property practitioners' views. *Cities, 83*, 52-164.

Murphy, L. A., Robertson, M. M., & Carayon, P. (2014). The next generation of macroergonomics: Integrating safety climate. *Accident Analysis and Prevention, 68*, 16–24.

Mustapha, Z., Aigbavboa, C., & Twala, W. (2018). *Contractor health and safety compliance for small to medium-sized construction companies* (1 ed.). Boca Raton, FL, USA: CRC Press.

Myers, D. (2013). *Construction Economics: A new approach* (3rd ed.). Oxon , UK: Routledge.

Nahar, L., Sulaiman, R., & Jaafar, A. (2019). "Bangla Braille learning application" in smartphones for visually impaired students in Bangladesh. *Interactive Learning Environments, 2019*, 1-14. https://doi.org/10.1080/10494820.2019.1619588

NASA. (1996, 6 4). *Sustainable Development Indicator Group, Construction Industry Categories*. Retrieved from National Aeronautics and Space Administration: https://www.hq.nasa.gov/iwgsdi/Construction.html

National Joint Council. (2003 , 10 29). *Definition of Workplace*. Retrieved from National Joint Council; Govenment of California: https://www.njccnm.gc.ca/decision.php?decision_id=215&lang=en

Naznin, H., & Karim, S. B. (2016). Skills Development Challenges of Bangladesh and Korea's Economic Emancipation: A Comparative Study. *Asian Profile, 44*(3), 271-283.

Nes, F. v., Abma, T., Jonsson, H., & Deeg, D. (2010). Language differences in qualitative research: is meaning lost in translation? *European Journal of Ageing, 7*, 313–316.

Ness, A. (2015, March). Lessons learned from recent process safety incidents. *Chemical Engineering Progress, 2015*, 23-29.

New Zealand Government . (2019). *Electricity (Safety) Regulations 2010.* Wellington: Ministry of Business, Innovation, and Employment, New Zealand

Niedbalski, J., & Ślęzak, I. (2016, September). Computer Analysis of Qualitative Data in Literature and Research Performed by Polish Sociologists. *Forum Qualitative Sozialforschung, 17*(3), 1-22.

Nielsen, K. J., Hansen, C. D., Bloksgaard, L., Christensen, A.D., Jensen, S. Q., & Kyed, M. (2015). The impact of masculinity on safety oversights, safety priority and safetyviolations in two male-dominated occupations. *Safety science, 76*, 82-89.

Niskanen, T., Louhelainen, K., & Hirvonen, M. L. (2016). A systems thinking approach of occupational safety and health applied in the micro-, meso- and macro-levels: A Finnish survey. *Safety Science, 82*, 212–227.

Noain-Sánchez, A. (2016). 'Privacy by default' and active 'informed consent' by layers: essential measures to protect ICT users' privacy. *Journal of Information, Communication and Ethics in Society, 14*(2), 124-138.

Nolan, A., Macfarlane, K., & Cartmel, J. (2013). *Research in Early Childhood* (1st ed.). Thousand Oaks, CA, USA: Sage Publications.

Okun, A. H., Watkins, J. P., & Schulte, P. A. (2017). Trade associations and labor organizations as intermediaries for disseminating workplace safety and health information. *American Journal of Industrial Medicine , 60*(9), 766-775.

Olson, K. (2016). *Essentials of Qualitative Interviewing* (1st ed.). New York, NY, USA: Routledge.

OSHE. (2018, 3 28). *Workplace accidents kill 179 construction workers in 2017* . Retrieved 12 28, 2018, from Bangladesh Occupational Safety, Health and Environment Foundation: https://www.oshebd.org/workplace-accidents-kill-179-construction-workers-in-2017/

Oswald, D., Ahiaga-Dagbui, D. D., Sherratt, F., & Smith:, S. D. (2020). An industry structured for unsafety? An exploration of the cost-safety conundrum in construction project delivery. *Safety Science, 122*, 104535-1-10. doi:https://doi.org/10.1016/j.ssci.2019.104535

Oswald, D., Sherratt, F., & Smith, S. D. (2017). An investigation into a health and safety rewards system on a large construction project. In P. W. Chan, & C. J. Neilson (Ed.), *Proceedings of the Thirty-Third Annual Association of Researchers in Construction Management Conference (ARCOM 2017)* (pp. 370-379). Manchester, United Kingdom: Association of Researchers in Construction Management.

Oswald, D., Sherratt, F., Smith, S. D., & Hallowell, M. R. (2018). Exploring safety management challenges for multi-national construction workforces: a UK case study. *Construction Management and Economics, 36*(5), 291-301.

Padgett, D. k. (2017). *Qualitative Methods in Social Work Research* (3rd ed.). Los Angeles, CA, USA: Sage Publications.

Palinkas, L. A., Horwitz, S. M., Green, C. A., Wisdom, J. P., Duan, N., & Hoagwood, K. (2015). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. *Administration and Policy in Mental Health and Mental Health Services Research, 42*(5), 533–544.

Pang, I. (2018, September 14). The Legal Construction of Precarity: Lessons from the Construction Sectors in Beijing and Delhi. *Critical Sociology, 2018*, 1-16. https://doi.org/10.1177/0896920518792615

Parmentola, A., Simoni, M., & Tutore, I. (2015). Which Policies can Encourage the Diffusion of new Technologies? A Literature Review. In R. P. Dameri, R. Garelli, & M. Resta (Ed.), *10th European Conference on Innovation and Entrepreneurship* (pp. 529-38). Genoa: Academic Conferences and Publishing International (ACPI).

Patton, M. Q. (2015). *Qualitative research & evaluation methods : integrating theory and practice* (4th ed.). Los Angeles, CA, USA: Sage Publications.

Pauw, H., Collins, C., & Gouws, S. (2017). African Migrants and European Expatriates: in Port Elizabeth, South Africa. In J. Krase, & Z. Uherek (Eds.), *Diversity and Local Contexts: Urban Space, Borders, and Migration* (1st ed., pp. 167-190). Cham, Switzerland: Palgrave Macmillan (Springer Nature).

Pavlovic, M. (2015). *Bioengineering: A Conceptual Approach.* Cham, Switzerland: Springer International Publishing.

Pedersen, K. Z. (2018). *Organizing Patient Safety Failsafe Fantasies and Pragmatic Practices.* London, England: Palgrave Macmillan.

Pelizzo, R., & Stapenhurst, F. (2014). *Corruption and Legislatures* (1st ed.). New York, NY, USA: Routledge.

Pfeffer, J., & Salancik, G. R. (2003). *The External Control of Organizations: A Resource Dependence Perspective* (1st ed.). Stanford, CA, USA: Stanford University Press.

Pine, J. C. (2007). The Contributions of Management Theory and Practice to Emergency Management. In D. A. Mcentire (Ed.), *Disciplines, Disasters and Emergency Management: The Convergence and Divergence of Concepts, Issues and Trends from the Research Literature* (1st ed., pp. 196-205). Springfield, IL, USA: Charles C. Thomas Publishers Limited.

Pinion, C., Brewer, S., Douphrate, D., Whitehead, L., & DelliFraine, J. (2017). The impact of job control on employee perception of management commitment to safety. *Safety Science, 93*, 70–75.

Polat, G. (2016). Subcontractor selection using the integration of the AHP and PROMETHEE methods. *Journal of Civil Engineering and Management, 22*(8), 1042-1054.

Polio, C., & Friedman, D. A. (2017). *Understanding, Evaluating, and Conducting Second Language Writing Research* (1st ed.). New York, NY , USA: Routledge.

Pollock, C. M. (2004). The use of human error data as indicators of changes in work performance. In A. M. Feyer, & A. Williamson (Eds.), *Occupational Injury: Risk, Prevention And Intervention* (pp. 56-72). London , England: taylor and Francis.

Poston, D. L., & Bouvie, L. F. (2010). *Population and Society: An Introduction to Demography* (1st ed.). Cambridge, England: Cambridge University Press.

Pourmazaherian, M., Baqutayan, S. M., & Idrus, D. (2017). The Role of the Big Five Personality Factors on Accident: A Case of Accidents in Construction Industries. *Journal of Science, Technology and Innovation Policy (JOSTIP), 3*(2), 46-66.

Proctor, R. W., & Zandt, T. V. (2018). *Human Factors in Simple and Complex Systems* (3rd ed.). Boca Raton, FL, USA: CRC Press.

Prothero, L., Georgopoulou, S., Galloway, J., Williams, R., Bosworth, A., & Lempp, H. (2016). Patients' and carers' views and expectations aboutintensive management for moderate rheumatoidarthritis: a qualitative study. *Psychology, Health & Medicine, 21*(8), 918-925.

Pruzan, P. (2016). *Research Methodology : The Aims, Practices and Ethics of Science.* Basel, Switzerland: Springer International Publishing AG.

Rahman, D. F., Ezaz, M. H., Halder, D., & Mondal, P. (2015). Contributing Factors Affecting the Safety in Construction Sites of Bangladesh. *Third Intl. Conf. on Advances in Civil, Structural and Mechanical Engineering - ACSM 2015* (pp. 123-128). Thailand: Institute of Research Engineers and Doctors, USA.

Rahman, M. (2018). Status of safety management system (sms) in the construction industry of Khulna city, Bangladesh. *Journal of Engineering Science, 9*(1), 97-102.

Rahman, S. M., & Mayer, A. L. (2015). How social ties influence metal resource flows in the Bangladesh ship recycling industry. *Resources, Conservation and Recycling, 104*, 254–264.

Ramachandra, T., & Rotimi, J. O. (2015). Causes of Payment Problems in the New Zealand Construction. *Construction Economics and Building, 15*(1), 43-55.

Rashid, M. M., & Johara, F. (2018). Corruption and Good Governance: The Case of Bangladesh. *International Journal of Engineering Technologies and Management Research, 5*(2), 133-142. doi: 10.5281/zenodo.1185086.

Rau, P.-L. P., Liao, P. C., Guo, Z., Zheng, J., & Jing, B. (2018). Personality Factors and Safety Attitudes Predict Safety Behaviour and Accidents in Elevator Workers. *International Journal of Occupational Safety and Ergonomics, 2018*, 1-9, doi:10.1080/10803548.2018.1493259.1.

Reason, J. (1990). *Human Error*. New York, NY, USA: Cambridge University Press.

Reason, J. (2016). *Organizational Accidents Revisited* (1st ed.). Boca Raton, Florida, USA: CRC Press.

Reese, C. D. (2012). *Accident/Incident Prevention Techniques* (2nd ed.). Boca Raton, Florida , USA: CRC Press.

Reese, C. D. (2017). *Occupational safety and health : fundamental principles and philosophies.* Boca Raton, FL, USA: CRC Press.

Relyea, D. B. (2013). *Popular Manufacturing Myths: Eliminating Widely Held Beliefs That Reduce Competitiveness.* Boca Raton, FL, USA: CRC Press.

Reza, S. (2016). Hyper-individualized Recruitment: Rural-urban Labour Migration and Precarious Construction Work in Bangladesh. *Migration, Mobility, & Displacement, 2*(2), 40-61.

Roberts, S. (2000). Employees Forgot Their Hard Hats Again? Seven Lessons from Behavior Based Safety for Increasing PPE Use. In E. S. Geller, & J. H. Williams (Eds.), *Keys to Behavior-Based Safety* (pp. 176-181). Rockville, Maryland, USA: Government Institutes.

Robertson, M. M., Hettinger, L. J., Waterson, P. E., Noy, Y. I., Dainoff, M. J., Levesonc, N. G., Carayon, P., & Courtney T. K. (2015). Sociotechnical approaches to workplace safety: Research needs and opportunities. *Ergonomics, 58*(4), 650–658.

Robson, C., & McCartan, K. (2016). *Real world research: A Resource for Users of Social Research Methods in Applied Settings* (4th ed.). West Sussex, UK: John Wiley and Sons Ltd.

Rodik, P., & Primorac, J. (2015, January). To Use or Not to Use: Computer-Assisted Qualitative Data Analysis Software Usage among Early-Career Sociologists in Croatia. *Forum Qualitative Sozialforschung, 16*(1), 1-21.

Røed-Larsen, S., & Stoop, J. (2017). ncertain future. Unsafe future? Or foresight in safety – theories, traditions and the ESReDA Safety Approach. In Z. Š. Ana Lisa Vetere Arellano (Ed.), *53rd ESReDA Seminar Proceedings, December 2018* (pp. 9-19). Ispra, Italy: European Safety, Reliability & Data Association (ESReDA) .

Rose, G. M., Kahle, L. R., & Shoham, A. (2000). Role Relaxation and Organizational Culture: A Social Values Perspective. In N. M. Ashkanasy, C. P. Wilderom, & M. F. Peterson (Eds.), *The Handbook of Organizational Culture and Climate* (pp. 437-446). Thousand Oaks, California: Sage Publications.

Rostami, A., Sommerville, J., Wong, I. L., & Lee, C. (2015). Risk management implementation in small and medium enterprises in the UK construction industry. *Engineering, Construction and Architectural Management, 22*(1), 91-107.

Roughton, J., & Crutchfield, N. (2014). *Safety Culture: An Innovative Leadership Approach* (1st ed.). Oxford, England: Butterworth- Heinemann .

Roulston, K. (2014). Analysing Interviews. In U. Flick (Ed.), *The SAGE Handbook of Qualitative Data Analysis* (1st ed., pp. 297-312). Thousand Oaks, CA, USA: Sage Publications.

Rowlinson, S., & Jia, Y. A. (2015). Construction accident causality: An institutional analysis of heat illness incidents on site. *Safety Science, 78*, 179-189.

Ruel, E., Wagner, W. E., & Gillespie, B. J. (2016). *The Practice of Survey Research: Theory and Applications.* Thousand Oaks, California, USA: Sage Publications.

Sabet, D. M., & Tazreen, A. (2015). Governing Growth: Understanding Problems in Real Estate Development in Dhaka, Bangladesh. *Journal of South Asian Development, 10*(1), 1–21.

Sacks, R., Whyte, J., Swissa, D., Raviv, G., Zhou, W., & Shapira, A. (2015). Safety by design: dialogues between designers and buildersusing virtual reality. *Construction Management and Economics, 33*(1), 55–72.

Sahni, y. P., & Vayunandan, E. (2012). *Administrative Theory*. New Delhi, India: PHI Learning private limited.

Saldaña, J. (2011). *Fundamentals of qualitative research.* New York, NY, USA: Oxford University Press Inc.

Saldaña, J. (2016). *The Coding Manual for Qualitative Researchers* (3rd ed.). London, England: Sage Publications.

Salmon, P. M. (2016). Bridging the gap between ergonomics methods research and practice: Methodological Issues in Ergonomics Science Part II. *Theoritical Issues in Ergonomics Science, 17*(5-6), 459-467.

Salmon, P. M., Goode, N., Taylor, N., Lenne, M. G., Dallat, C. E., & Finch, C. F. (2017). Rasmussen's legacy in the great outdoors: A new incident reporting and learning system for led outdoor activities. *Applied Ergonomics, 59B,* 637-648. https://doi.org/10.1016/j.apergo.2015.07.017

Salmona, M., & Kaczynski, D. (2016, September). Don't Blame the Software: Using Qualitative Data Analysis Software Successfully in Doctoral Research. *Forum Qualitative Sozialforschung, 17*(3), 1-23.

Samers, M., & Collyer, M. (2017). *Migration* (2nd ed.). New York, NY, USA: Routledge.

Sargeant, J. (2012). Qualitative Research Part II: Participants, Analysis, and Quality Assurance. *Journal of Graduate Medical Education, 4*(1), 1-3.

Sasaki, R., Seike, T., & Kim, Y. (2018). Descriptive analysis of decision making criteria for building retrofit construction: A case study of Bangladesh. *Journal of Architecture and Built Environment, 45*(2), 101-112.

Saunders, B., Sim, J., Kingstone, T., Baker, S., Waterfield, J., Bartlam, B., Burroughs, H., & Jinks, C. (2017). Saturation in qualitative research: exploring its conceptualization and operationalization. *Quality and Quantity*, *52*(4), 1893–1907.

Saunders, M., Lewis, P., & Thornhill, A. (2016). *Research Methods for Business Students* (7th ed.). Essex, England: Pearson Education Limited.

Scales, J. M., & Irwin, C. E. (2009). The Biopsycosocial Model. In R. J. DiClemente, J. S. Santelli, & R. A. Crosby (Eds.), *Adolescent Health: Understanding and Preventing Risk Behaviors* (pp. 31-50). San Francisco, CA: Jossey Bass.

Scheppingen, A. R., Have, K. C., Zwetsloot, G. J., Kok, G., & Mechelen, W. V. (2015). Determining organisation-specific factors for developing health interventions in companies by a Delphi procedure: Organisational Mapping. *Journal of Health Psychology, 20*(12), 1509–1522.

Schuerkens, U. (2017). *Social Changes in a Global World* (1st ed.). Thousand Oaks, CA, USA: Safe Publications Inc.

Scott, W. R., & Davis, G. F. (2016). *Organizations and Organizing: Rational, Natural and Open Systems Perspectives.* New York: Routledge.

Segerstedt, A., & Olofsson, T. (2010). Supply chains in the construction industry. *Supply Chain Management: An International Journal, 15*(5), 347–353.

Seidman, I. (2013). *Interviewing as Qualitative Research: A Guide for Researchers in Education and the Social Sciences* (4th ed.). New York, NY , USA : Teachers College Press.

Seim, R., Limborg, H. J., & Jensen, P. L. (2015). Professionalization of occupational health and safety management in Danish companies and the effects on worker participation. *Proceedings 19th Triennial Congress of the IEA* (pp. 1-8). Melbourne: International Ergonomics Association (IEA).

Senouci, A., Al-Abbadi, I., & Eldin, N. (2015). Safety improvement on building construction sites in Qatar. *Procedia Engineering, 123*, 504 – 509.

Seo, H. C., Lee, Y.-S., Kim, J. J., & Jee, N.Y. (2015). Analyzing safety behaviors of temporary construction workers using structural equation modeling. *Safety Science, 77*, 160–168.

Sepasgozar, S. M., & Davis, S. (2018). Construction Technology Adoption Cube:An Investigation on Process, Factors, Barriers, Drivers and Decision Makers Using NVivo and AHP Analysis. *Buildings, 8*(6), 1-31.

Serrat, O. (2017). *Knowledge Solutions: Tools, Methods, and Approaches to Drive Organizational Performance.* Singapore: Springer.

Shafaeddin, M. (2014). *Competitiveness and Development: Myth and Realities* (1st ed.). London: Anthem Press.

Shafritz, J., Ott, J. S., & Jang, Y. S. (2016). *Classics of Organization Theory* (8th ed.). Andover, UK: Cengage Learning.

Shah, J. (2009). *Supply Chain Management: Text and Cases* (1st ed.). Delhi, India: Dorling Kindersley India (Pvt.) Ltd.

Shaikh, S. (2010). *Business Environment.* Delhi: Pearson Education India.

Shane, J. (2013). *Learning from Error in Policing: A Case Study in Organizational Accident Theory*. New York, NY, USA: Springer Heidelberg.

Shen, Y., Ju, C., Koh, T. Y., Rowlinson, S., & Bridge, A. J. (2017). The Impact of Transformational Leadership on Safety Climate and Individual Safety Behavior on Construction Sites. *International Journal of Environmental Research and Public Health, 15*(45), 1-17.

Sherratt, D. F. (2016). *Unpacking Construction Site Safety* (1st ed.). Chichester, West Sussex, England: John Wiley & Sons Ltd.

Sherratt, F., & Sherratt, S. (2017). The Road to Hell: Worker Health, Safety and Wellbeing within UK Corporate Social Responsibility Practices. In P. W. Chan, & C. J. Neilson (Ed.), *Proceeding of the 33rd Annual ARCOM Conference* (pp. 389-398). Cambridge, UK: Association of Researchers in Construction Management.

Shkedi, A. (2005). *Multiple Case Narrative: A Qualitative Approach to Studying Multiple Populations* (1st ed.). Amsterdam, Netherlands: John Benjamins Publishing Company.

Silverman, D. (2017). *Doing Qualitative Research.* London, England: Sage Publications.

Sim, J., Saunders, B., Waterfield, J., & Kingstone, T. (2018). Can sample size in qualitative research be determined a priori? *International Journal of Social Research Methodology, 21*(5), 1-16.

Simpson, G., & Horberry, T. (2018). *Understanding Human Error in Mine Safety*. London: CRC press.

Smith, C. A., Organ, D. W., & Near, J. P. (1983). Organizational Citizenship Behavior: Its Nature and Antecedents. *Journal of Applied Psychology*, *68*(4), 653-663.

Smith, E. N. (2014). *Workplace security essentials : a guide for helping organizations create safe work environments* (1st ed.). Waltham, MA, USA: Butterworth-Heinemann.

Smith, S. D., Sherratt, F., & Oswald, D. C. (2017). The antecedents and development of unsafety. *Proceedings of the Institution of Civil Engineers - Management, Procurement and Law*, *170*(2), 59-67.

Smither, R., Houston, J., & McIntire, S. (2016). *Organization Development: Strategies for Changing Environments* (2nd ed.). New York: Routledge.

Soltanzadeh, A., Mohammadfam, I., Moghimbeygi, A., & Ghiasvand, R. (2017). Exploring Causal Factors on the Severity Rate of Occupational Accidents in Construction Worksites. *International Journal of Civil Engineering*, *15*(7), 959–965.

Søreide, T. (2014). Corruption and competition: Fair markets as an anticorruption device. *Nagoya Journal of law and Politics*, *258*, 237-262.

Søreide, T. (2016). *Corruption and Criminal Justice: Bridging Economic and Legal Perspectives* (1st ed.). Cheltenham, UK: Edward Elgar Publishing.

Spencer, L., Ritchie, J., & O'Connor, W. (2013). Analysis: Practices, Principles and Processes. In J. Ritchie, & J. Lewis (Eds.), *Qualitative Research Practice: A Guide for Social Science Students and Researchers* (1st ed., pp. 199-218). London, England: Sage Publications.

Srivastava, V. (2017). Eastern Housing Limited—Marketing Strategies of Real Estate Company in Bangladesh. *Vision*, *21*(1), 93–96.

Stergiou-Kita, M., Mansfield, E., Bezo, R., Colantonio, A., Garritano, E., Lafrance, M., Lewko, J., Mantis, S., Moody, F., Power, N., Theberge, N., & Westwood, E., Travers, K. (2015). Danger zone: Men, masculinity and occupational health and safety in high risk occupations. *Safety Science*, *80*, 213–220.

Stiles, S., Ryan, B., & Golightly, D. (2018). Readiness to Change: Perceptions of Safety Culture up and down the Supply Chain. In S. Bagnara, R. Tartaglia, S. Albolino, T. Alexander, & Y. Fujita (Eds.), *Proceedings of the 20th Congress of the International Ergonomics Association* (pp. 213-223). Cham: Springer.

Strauss, K., & McGrath, S. (2017). Temporary migration, precarious employment and unfree labour relations: Exploring the 'continuum of exploitation' in Canada's Temporary Foreign Worker Program. *Geoforum, 78*, 199-208.

Sultana, S. (2018). Designing a Course with Critical Thinking Focus: Developing Basic English Skills for the Students of Computer Science and Engineering at a Private University of Bangladesh. *Global Journals Inc, 18*(12), 29-37.

Sundström, G., & Hollnagel, E. (2006). Learning How to Create Resilience in Business Systems. In E. Hollnagel, D. D. Woods, & N. Leveson (Eds.), *Resilience Engineering: Concepts and Precepts* (pp. 235-252). Hampshire, England: Ashgate Publishing Limited.

Sunindijo, R. Y. (2015). Improving safety among small organisations in the construction industry: key barriers and improvement strategies. *Procedia Engineering, 125*, 109-116.

SWA. (2015). *Work-related Injuries and Fatalities in Construction, Australia, 2003 to 2013.* Canberra: Safe Work Australia.

Swanson, P. (2013). *An Introduction to Capitalism* (1st ed.). London, UK: Routledge.

Swezey, R. W., Meltzer, A. L., & Salas, E. (2009). Some Issues Involved in Motivating Teams. In H. F. O'Neil, & M. Drillings (Eds.), *Motivation: Theory and Research* (pp. 141-170). New York: Routledge.

Swuste, P., Gulijk, C. v., Zwaard, W., & Oostendorp, Y. (2014). Occupational safety theories, models and metaphors in the three decades since World War II, in the United States, Britain and the Netherlands: A literature review. *Safety Science, 62* , 16–27.

Syed, J., & Kramar, R. (2017). *Human Resource Management: A Global and Critical Perspective* (2nd ed.). London: Palgrave.

Tah, J. H. (2009). Future Agent-Driven Virtual Prototyping Environments in Construction. In P. S. Brandon, & T. Kocatürk (Eds.), *Virtual Futures for Design, Construction and Procurement* (pp. 211 - 229). Oxford, UK: Blackwell publishing Limited.

Takhtravanchi, M., & Pathirage, C. (2018). Knowledge integration challenges and critical success factors within construction traditional procurement system. *Knowledge and Performance Management, 2*(1), 27-40.

Talukder, M. A., & Jahan, S. M. (2016). Light Engineering Business Ecosystem in Bangladesh:A Study on Institutional Preparedness. *International Organization of Scientific Research (IOSR) Journal of Business and Management, 18*(12), 16-26.

Talukder, M. A., & Jahan, S. M. (2017). Competitiveness and Growth Hindrances of Light Engineering Industry of Bangladesh: A Study on Micro, Small and Medium-Sized Enterprise (MSME) Owners. *Developing Country Studies, 7*(2), 30-41.

Tao, D., Zhang, R., & Qu, X. (2017). The role of personality traits and driving experience in self-reported risky driving behaviors and accident risk among Chinese drivers. *Accident Analysis and Prevention, 99*, 228–235.

Tarik, B., & Adil, H. A. (2018). Occupational health and safety in the Moroccan construction. *International Journal of Metrology and Quality Engineering, 9*(6), 1-9.

Tchiehe, D. N., & Gauthier, F. (2017). Classification of risk acceptability and risk tolerability factors in occupational health and safety. *Safety Science, 92*, 138–147.

Temple, B., & Young:, A. (2004). Qualitative research and translation dilemmas. *Qualitative Research, 4*(2), 161-178.

Ternov, S. (2011). The human side of medical mistakes. In P. L. Spath (Ed.), *Error Reduction in Health Care: A Systems Approach to Improving Patient Safety* (2nd ed., pp. 21-34). San Francisco, CA, USA: John Wiley & Sons Inc.

Ternov, S. (2011a). MTO and DEB Analysis Can Find System. In P. L. Spath (Ed.), *Error reduction in health care : a systems approach to improving patient safety* (2nd ed., pp. 157-170). San Francisco, CA, USA: John Wiley and Sons Inc.

Terry, A. J. (2018). *Clinical Research for the Doctor of Nursing Practice* (3rd ed.). Burlington, MA, USA: Jones and Barlett Learning.

Tester, J. W., Drake, E. M., Driscoll, M. J., Golay, M. W., & Peters, W. A. (2012). *Sustainable Energy: Choosing Among Options* (2nd ed.). Cambridge, MA, USA: The MIT Press.

The Bangladesh Post. (2018, 09 16). *Stress on improving safety of construction workers.* Retrieved 12 28, 2018, from The Bangladesh Post: https://www.bangladeshpost.net/stress-on-improving-safety-of-construction-workers/

The Daily Star. (2016, 3 4). *Issue recruitment cards for construction workers.* Retrieved 1 25, 2019, from The Daily Star: https://www.thedailystar.net/city/issue-recruitment-cards-construction-workers-786037

The Daily Star. (2017, 5 1). *Informal Sector: Workers lack legal, social protection.* Retrieved 4 4, 2019, from The Daily Star: https://www.thedailystar.net/frontpage/informal-sector-workers-lack-legal-social-protection-1399027

The Daily Star. (2018, 4 24). *Bangladesh's garment industry now a model for workplace safety.* Retrieved 12 29, 2018, from The Daily Star: https://www.thedailystar.net/business/bangladeshs-garment-industry-now-model-workplace-safety-1567009

The Dhaka Tribune. (2016, 10 4). *Poor safety measures result in casualty at construction sites.* Retrieved 12 28, 2018, from The Dhaka Tribune: https://www.dhakatribune.com/bangladesh/2016/10/04/poor-safety-measures-result-casualty-construction-sites

The Financial Exress. (2018, 1 25). *179Construction workers die in 2017, study reveals Lack of safety gears, risky condition.* Retrieved 12 28, 2018, from The Financial Express: http://today.thefinancialexpress.com.bd/print/179-construction-workers-die-in-2017-study-reveals-1516812038

The Financial Times. (2018, 4 12). *Rana Plaza five years on — safety is greater but not guaranteed.* Retrieved 12 28, 2012, from The Financial Times: https://www.ft.com/content/7ec413ec-46e6-11e8-8ee8-cae73aab7ccb

The Indepenent . (2018, 1 7). *Workplace Safety* . Retrieved 1 8, 2019, from The Independent Bangladesh : http://www.theindependentbd.com/arcprint/details/131508/2018-01-07

The Newage Bangladesh. (2018, 1 19). *Safe workplace for construction workers demanded.* Retrieved 12 29, 2018, from http://www.newagebd.net/article/32917/safe-workplace-for-construction-workers-demanded

Theodore, N. (2015). Rebuilding the House of Labor: Unions and Worker Centers in the Residential. *WorkingUSA: The Journal of Labor and Society, 18,* 59–76.

Theodore, N., Blaauw, D., Schenck, C., Abel V., Schoeman, C., & Meléndez, E. (2015). Day labor, informality and vulnerability in South Africa and the United States. *International Journal of Manpower, 36*(6), 807-823.

Thomas, D. R., & Hodges, I. D. (2010). *Designing and Managing Your Research Project: Core Skills for Social and Health Research.* London: Sage Publications.

Thomassen, O. J., Heggen, K., & Strand, R. (2017). Applying principles of sociotechnical systems onto working environment research. *Nordic journal of working life studies, 7*(S2), 51-65.

Tolley, E. E., Ulin, P. R., Mack, N., Robinson, E. T., & Succop, S. M. (2016). *Qualitative Methods in Public Health: A Field Guide for Applied Research* (2nd ed.). San Francisco, California, USA: Jossey-Bass & Pfeiffer.

Tracy, S. J. (2013). *Qualitative Research Methods: Collecting Evidence, Crafting Analysis, Communicating Impact.* West Sussex, UK: Wiley-Blackwell.

Trainor, A. A. (2013). Interview Research. In A. A. Trainor, & E. Graue (Eds.), *Reviewing Qualitative Research in the Social Sciences* (pp. 125-138). New York, NY, USA: Routledge.

Trinchero, E., Farr-Wharton, B., & Brunetto, Y. (2018). A social exchange perspective for achieving safety culture in healthcare organizations. *International Journal of Public Sector Management*, DOI 10.1108/IJPSM-06-2017-0168.

Tsui, A. S., & Wu, J. B. (2005). The new employment relationship versus the mutual investment approach: Implications for human resource management. *Human Resource Management, 44*(2), 115–121.

Turku, H. (2009). *Isolationist States in an Interdependent World.* Surrey, England: Ashgate Publishing Limited.

Tweedy, J. T. (2014). *Healthcare Hazard Control and Safety Management* (3 ed.). Boca Raton, FL, USA: CRC Press.

Ulin, P. R., Robinson, E. T., Tolley, .E., & Succop, S. M. (2016). *Qualitative Methods in Public Health: A Field Guide for Applied Research* (2nd ed.). Hoboken, NJ, USA: John Wiley & Sons, Inc.

Umar, T., & Egbu, C. (2018). Causes of construction accidents in Oman. *Middle East Journal of Management, 5*(1), 21-33.

Umeokafor, N. (2017). An appraisal of the barriers to client involvement in health and safety in Nigeria's construction industry. *Journal of Engineering, Design and Technology, 15*(4), 471-487.

Underwood, P., & Waterson, P. (2014). Systems thinking, the Swiss Cheese Model and accident analysis:A comparative systemic analysis of the Grayrigg train derailment using the ATSB, AcciMap and STAMP models. *Accident Analysis and Prevention, 68*, 75-94.

Valence, G. d. (2011). Market types and construction markets. In G. d. Valence (Ed.), *Modern Construction Economics:Theory and application* (1st ed., pp. 171-190). New York, NY, USA: Spon Press (Taylor & Francis Group).

Valence, G. D. (2011a). Competition and barriers to entry in the construction industry. In G. D. Valence (Ed.), *Modern Construction Economics:Theory and application* (1st ed., pp. 110-116). New York, NY, USA: Spon Press (Taylor & Francis Group).

Valluru, C. T., Dekker, S., & Rae, A. (2017). How and why do subcontractors experience different safety on high-risk work sites? *Cognition, Technology & Work, 19*(4), 785–794 .

Vidalakis, C., Tookey, J. E., & Sommerville, J. (2013). Demand uncertainty in construction supplychains: a discrete event simulation study. *Journal of the Operational Research Society, 64*, 1194–1204.

Vincoli, J. W. (1994). *Basic Guide to Accident Investigation and Loss Control* (1 ed.). New York: John Wiley and Sons.

Viramuthu, V. A. (2017). Human Factors Engineering HFE: A Review of Human Elements that have Contributed in the Occurrence of Major Accidents in Process Industries and Total Abu Al Bukhoosh TABK Means of Engineering Effective Mitigations. *Abu Dhabi International Petroleum Exhibition & Conference* (pp. SPE-188287-MS-1-15). Abu Dhabi, UAE : Society of Petroleum Engineers.

Vogt, W. P., Vogt, E. R., Gardner, D. C., & Haeffele, L. M. (2014). *Selecting the Right Analyses for Your Data: Quantitative, Qualitative and Mixed Methods* (1st ed.). New York, NY, USA: Guilford Publications Inc.

Wahab, S. R., Rajab, A., Shaari, R., Rahman, S. A., & Saat, M. M. (2014). Manipulation of Safety Training Practices on Organizational Safety Performance: An Evidence in Malaysia's Automotive Industry. *International Journal of Trade, Economics and Finance, 5*(1), 110-113.

Walker, A. (2015). *Project Management in Construction* (6th ed.). Chichester, West Sussex, United Kingdom: John Wiley and Sons Ltd.

Wallace, B., & Ross, A. (2006). *Beyond Human Error: Taxonomies and Safety Science* (1st ed.). Boca Raton , FL, USA: CRC Press.

Wang, J., Zou, P. X., & Li, P. P. (2016). Critical factors and paths influencing construction workers' safety risk tolerances. *Accident Analysis and Prevention, 93*, 267-279.

Wang, T., Long, L., Zhang, Y., & He, W. (2018). A Social Exchange Perspective of Employee–Organization Relationships and Employee Unethical Pro-organizational Behavior: The Moderating Role of Individual Moral Identity. *Journal of Business Ethics*, *159*, 473–489.

Ward, C., & Geeraert, N. (2016). Advancing acculturation theory and research: the acculturation process in its ecological context. *Current Opinion in Psychology, 8*, 98–104.

Waris, M., Liew, M. S., Khamidi, M. F., & Idrus, A. (2014). Criteria for the selection of sustainable onsite construction equipment. *International Journal of Sustainable Built Environment, 3*(1), 96–110.

Wei, Y., & Miraglia, S. (2017). Organizational culture and knowledge transfer in project-based organizations: Theoretical insights from a Chinese construction firm. *International Journal of Project Management, 35*, 571–585.

Weller, S. C., Vickers, B., Bernard, H. R., Blackburn, A. M., Borgatti, S., Gravlee, C. C., & Johnson, J.(2018). Open-ended interview questions and saturation. *PLoS ONE,13*(6): e0198606. https://doi.org/10.1371/journal.pone.0198606

Whittingham, R. B. (2004). *The blame machine : why human error causes accidents.* Burlington, MA, USA: Elsevier Butterworth-Heinemann.

WHO. (2007). *International Classification of Functioning, Disability and Health (ICF): Children and youth version* . Geneve, Switzerland : World Health Organization.

Wiegmann, D. A., & Shappell, S. A. (2017). *A Human Error Approach to Aviation Accident Analysis:The Human Factors Analysis and Classification System.* London: Routoledge.

Wiengarten, F., & Longoni, A. (2018). How does uncertainty affect workplace accidents? Exploring the role of information sharing in manufacturing networks. *International Journal of Operations & Production Management, 38*(1), 295-310,.

Williams, D. R. (1998). *What is Safe?: The Risks of Living in a Nuclear Age.* Cambridge, UK: The Royal Society of Chemistry.

Williams, O. S., Hamid, R. A., & Misnan, M. S. (2017). Analysis of Fatal Building Construction Accidents: Cases and Causes. *Journal of Multidisciplinary Engineering Science and Technology*, *4*(8), 8030-8040.

Willig, C. (2013). *Introducing Qualitative Research in Psychology* (3rd ed.). Berkshire, England: Open University Press .

Wilson, A. (2019). *Marketing Research: Delivering customerinsight* (4th ed.). London , Great Britain : Red Globe Press .

Winge, S., & Albrechtsen, E. (2018). Accident types and barrier failures in the construction industry. *Safety Science, 105* , 158–166.

Winge, S., Albrechtsen, E., & Mostue, B. A. (2019). Causal factors and connections in construction accidents. *Safety Science, 112*, 130–141.

Wong, J. P.-H., & Poon, M. K.-L. (2010). Bringing Translation Out of the Shadows: Translation as an Issue of Methodological Significance in Cross-Cultural Qualitative Research. *Journal of Transcultural Nursing*, *21*(2), 151-158.

Woods, D. D., Dekker, S., Cook, R., Johannesen, L., & Sarter, N. (2017). *Behind Human Error* (2nd ed.). London, England: CRC Press.

Woolley, M. J., Goode, N., Read, G. J., & Salmon, P. M. (2018). Moving beyond the organizational ceiling: Do construction. (P. Salmon, & G. Read, Eds.) *Human Factors and Ergonomics in Manufacturing & Service Industries*, *28*(6), 297-308.

Workplace Safety and Health Institute. (2017). *Global Estimates of Occupational Accidents and Work-related Illnesses 2017.* Singapore: Workplace Safety and Health Institute (Ministry of Manpower), Singapore.

Wray, J., Archibong, U., & Walton, S. (2017). Why undertake a pilot in a qualitative PhD study? Lessons learned to promote success. *Nurse Researcher, 24*(3), 31-35.

WSH-Institute. (2016). *Workplace safety and health report Jan-Jun 2016.* Singapore: Workplace Safety and Health (WSH) Institute, Singapore.

Wu, F., & Chi, Y. (2015). Regulatory system reform of occupational health and safety in China. *Industrial Health , 53*(3), 300–306.

Yang, S., Xiao, H., & Tse, C. Y. (2013). Leisure in an Urban Environment – A Perspective of University Students . In M. Li, & W. Bihu (Eds.), *Urban Tourism in China* (1st ed., pp. 65-80). London, UK: Routledge .

Ye, J. (2014). Migrant masculinities: Bangladeshi men in Singapore's labour force. *Gender, Place & Culture: A Journal of Feminist Geography, 21*(8), 1012-1028.

Yin, R. K. (2014). *Case study research : design and methods* (5th ed.). Thousand Oaks, California , USA: Sage Publications.

Yin, R. K. (2016). *Qualitative Research from Start to Finish* (2nd ed.). New York, NY, USA: The Guilford Press.

Yiu, N. S., Szeb, N., & Chan, D. W. (2018). Implementation of safety management systems in Hong Kong construction industry – A safety practitioner's perspective. *Journal of Safety Research, 64*, 1-9.

Zahoor, H., Chan, A. P., Gao, R., & Utama, W. P. (2017). The factors contributing to construction accidents in Pakistan: their prioritization using the Delphi technique. *Engineering, Construction and Architectural Management, 24*(3), 463-485.

Zhang, C., & Zou, Y. (2017). Role of Operational Excellence in Construction Industry: A review. *International Journal of Engineering and Applied Sciences, 4*(5), 29-33.

Zhang, J., Zhang, W., Xu, P., & Chen, N. (2019). Applicability of accident analysis methods to Chinese construction accidents. *Journal of Safety Research, 68*, 187-196.

Zhao, Z.-Y., Zhao, X.-J., Davidson, K., & Zuob, J. (2012). A corporate social responsibility indicator system for construction enterprises. *Journal of Cleaner Production, 29*, 277-289.

Zhu, H., Duncan, T., & Tucker, H. (2019). The issue of translation during thematic analysis in a tourism research context. *Current Issues in Tourism, 22*(4), 415-419.

Zimmerman, E. B., Woolf, S. H., & Haley, A. (2015). Understanding the Relationship Between Education and Health: A Review of the Evidence and an Examination of Community

Perspectives. In R. M. Kaplan, M. L. Spittel, & D. H. David (Eds.), *Population Health: Behavioral and Social Science Insights* (pp. 347-383). Rockville, MD, USA: AHRQ (Agency for Healthcare Research and Quality) Publications.

Zohar, D., & Polachek, T. (2014). Discourse-based intervention for modifying supervisory communication as leverage for safety climate and performance improvement: a randomized field study. *Journal of Applied Psychology, 99*(1), 113-24.

Zohar, D., Huang, Y.-h., Lee, J., & Robertson, M. M. (2015). Testing extrinsic and intrinsic motivation as explanatory variables for the safety climate–safety performance relationship among long-haul truck drivers. *Transportation Research, 30* (F), 84-96.

Zwetsloot, G. I., Kines, P., Ruotsala, R., Drupsteen, L., Merivirta, M.-L., & Bezemer, R. A. (2017). The importance of commitment, communication, culture and learning for the implementation of the Zero Accident Vision in 27 companies in Europe. *Safety Science, 96*, 22–32.

APPENDICES

Appendix 1: Permission to conduct research

Fakulti Sains Kognitif dan Pembangunan Manusia
Faculty of Cognitive Sciences and Human Development

www.unimas.my

UNIMAS/NC-16.02/04-05 Jld. III (23)

19 August 2016

To Whom It May Concern

Dear Sir / Madam,

Permission to Conduct Research in the Fulfillment of Postgraduate Degree

With reference to the above matter, I would like to request permission for the following student from the Faculty of Cognitive Sciences and Human Development, Universiti Malaysia Sarawak, to conduct a survey and a series of interviews at the state ministries, departments, statutory agencies, local authorities, district and resident offices.

Student name	:	Mohammad Fazley Hossain Chowdhury (Student ID : 140101731)
Telephone	:	+6 01125886024
Program	:	PhD by Research, Human Resource Development
Research title	:	The Mediating Role of Safety Climate in the Relationship Between Safety Leadership and Safety Performance at Construction Industries in Sarawak, Malaysia
Research phases	:	Data Collection (Interviews, Discussions, Observation and Document Analysis)
Principle supervisor	:	Prof Dr Rusli Ahmad
Telephone	:	+6082-581561 / +6012-8729248
Fax	:	+6082-581567
Email	:	arusli@unimas.my

His research is purely for academic purpose and all information will be kept secure and treated as strictly confidential. The support and cooperation given by your organization for the success of this research is highly appreciated.

Thank you.

Sincerely,

Dr Philip Nuli Anding
Deputy Dean (Postgraduate & Research)

Appendix 2: Introductory letter to responding organizations/individuals

Dear Sir/ Madam,

Salaam and Greetings.

I, Mohammad Fazley Hossain Chowdhury, am a postgraduate student from Faculty of Cognitive Sciences and Human Development (FCSHD) in Universiti Malaysia Sarawak (UNIMAS). This study aims to explore the factors influencing unsafe work situation in Bangladesh construction industries as a requirement of PhD (HRM) degree.

The research involves participation of individuals (who are directly and indirectly involved with construction industry of Bangladesh that includes housing construction) to explore influencing factors for unsafe work situations in terms of in-depth interview that might take 45-50 minutes. This interview will be at the places convenient to the interviewer and interviewee. The language of communication will be in Bangla. Anyone who is associated with construction organizations including designers, engineers, manager at various level, safety personnel, supervisor, site personnel, craftsmen or subcontractors. The honesty, truthfulness and justifications from participant are vital for this study.

The interview will be initiated with the individuals those are willing and hold the potential to contribute in terms of information. This interview participation is voluntary, the detail is staed in the consent form attached herewith.

The researcher appreciates effort, attention and valuable time.

Regards

Mohammad Fazley Hossain Chowdhury

(Matric no: 14010173)

Faculty of Cognitive Sciences & Human Development (FCSHD)

Universiti Malaysia Sarawak (UNIMAS)

94300, Kota Samarahan, Sarawak, Malaysia.

Email: fazhc@yahoo.com

Appendix 3: Consent Letter: For Interview

I, _____hereby grant my approval to be an informant in the research study carried by Mohammad Fazley Hossain Chowdhury, bearing the Matric Number 14010173, a PhD researcher from Faculty of Cognitive Sciences and Human Development (FCSHD), Universiti Malaysia Sarawak (UNIMAS), Malaysia.

I understand that, the research is an integral component for fulfilling the requirement of PhD (HRM) degree. The research activity of the interviewer is supervised by a Professor from the same faculty. This interview session will be 45-60 minutes long, while there are chances of taking more than one interview session till the objective of the research is attained satisfactorily.

The interview session might necessitate information from the interviewee in verbal and written form. This is to assist the interviewer for further understanding of the informant and information given. While the interview takes place, interviewees might feel that his/her privacy is violated or research question might cause disturbance/uneasiness on mental state.

Even though the interviewee is invited by the researchers to be an informant, interviewee reserves his/her right to participate the session voluntarily. Again, the interviewee holds the right to withdraw himself from the session anytime during the interview (specially in case of experiencing any disturbance or uneasiness caused by interview) informing the interviewer. The identity of the interviewee will not be linked with information provided during session.

While all the information provided will remain anonymous and kept in accordance with the existing data protection act (if any active during the session). Furthermore no copy of the interview, in any form, will be send to the organization whom the interviewee belongs for ensuring anonymity.

Interviewee has been provided with an explanation of the research in which he/she is participating in and have been given the details to contact for further query .

Neither UNIMAS nor any of the representatives of the interviewer has any provision for monetary compensation in this event of injury (physical or mental) during the time of the interaction No remuneration in any form will be offered for participating the research.

By signing this form I am stating that I am over 18 years of age, and understanding the above circumstances I hereby consent to participate in this research.

Name of the interviewee:

Address:

Signature: Date:

Demographic information of the informants

Participants are requested to choose their answer by marking (√) or writing on answer options,

1. Gender and Age: …….. Yrs

a. Male ☐ b. Female ☐

2. Highest level of education:

a. Primary school ☐ d. Professional diploma ☐

b. Secondary school ☐ e. Graduation ☐

c. Trade certificate ☐ f. Post graduate ☐

3. Total working experience in construction industry: _____ years and _____months.

4. Present position at organization:

a. Manager ☐ e. Supervisor ☐

b. Executive ☐ d. Staff /Technician ☐

e. Others (Please specify) _____

5. Area of work:

a. Occupational Safety & Health ☐ c. Engineering ☐

b. Human resource Management ☐ d. Others (Please Specify) _____

6. Experience to any exposure to accidents at work:

Yes ☐ b. No ☐

if the answer for Question 6 is 'Yes' please answer question no.7

7. What type of hazard consequence that hazard caused

a. Injury on self ☐ c. Fatality ☐

b. Injury on others ☐ d. Damage of material ☐

Thank you for your kind participation

Appendix 4: Interview guide

In an interview the researcher might initiate and continue the interview from as the following sequence

1. Greetings and warm up conversation
2. Asking interviewees perspective on unsafe situation in construction
    a. Events or elements that are internal to organizations
    b. Events and elements that are associated with individuals' back ground
    c. Event and elements that are external to organizations
3. Individuals perspectives how these events or elements are connected to unsafe situations
4. Records of location, time and individuals

Appendix 5: Audit Trail

December 2018: Based on literature review, the potential area of interest of interview is structured as well as primary list for individual category is formed.

January 2019: Current list of the real estate firms situated in Dhaka is availed from www.rehab-bd.org. List of the Communicated organizations and individuals holding positions (as of previously structured category) are sorted based on the visiting company websites given on REHAB list for Dhaka based real estate firms (25 from 1048).

January-February 2019: Discussion with 6 IEB members from civil engineering wing who have 10-20 years of experience in residential construction projects; a short list of 3 designer firms, 3 contractors, 4 subcontractor and 2 clients is prepared from the discussion. Current list of the banks are availed from Bangladesh Bank website, and a short list of 4 is made from 59 schedule banks. From ILO website, two NGOs are identified that work with ILO in Bangladesh for occupational safety.

February 2019: out of the 6 contacted real estate firms two are confirmed for interview, these two interviews are conducted as pilot.

March to May 2019: 13 interviews are taken from 13 different categories of individuals belonging to 5 real estate firms, 1 designer firm, 1 contractor, 1 trade subcontractor, 1 labor subcontractor , 1 financial institute and 1social organization. Individuals are informed of the consent form and the interview process followed by face to face interview by the researcher himself. After the interview, interviewees are provided with the opportunity to review transcripts. However, none responded till June 2019.

February to June 2019: There are two stages of analysis. The synchronic data are coded and grouped under theme for first three objectives of study. The diachronic data is arranged in sequences to address the second objective.

June 2019: the summary of the findings are conveyed to the interviewees and their opinion of the finding is requested. However, none responded in that month.

Appendix 6: Transcription of the interview

The transcription of all 15 interviews is stored in the compact disc attached with the thesis.