Occupational Health and Safety practices and challenges in the construction industry of Bhutan: a situation analysis

DekiPelzomDukpa* and PhuntshoDendup**

* MBA, MIPH, MBBS, Center for Research Initiatives, Thimphu, Bhutan, pelzomd@gmail.com
** Department of Labour, Ministry of Labour and Human Resources, Thimphu, Bhutan

Abstract- The construction industry is one of the most hazardous industrial fields, wherein the construction workers are prone to work related accidents resulting in disabilities and/or deaths. The probability of fatality in the construction industry is five times more likely than in the manufacturing industry.

In developing countries, construction work is ten times more dangerous than in industrialized countries. ILO (2016) estimated that of all workplace accidents, about 30% of fatal accidents occur at construction sites. Similarly, the construction industry in Bhutan accounts for 60% of total workplace accidents in the country.

This paper will evaluate the existing Occupational Health and Safety (OHS) practices in the construction industry of Bhutan. It will also identify the challenges and problems faced by both the contractors and those attempting to implement OHS policies and procedures.

A study was conducted involving 119 participants from several construction companies and government regulatory organizations relevant to the construction industry in Bhutan. Data was collected through questionnaire surveys, interviews and discussions. The study identified a number of OHS problems in the construction industry, including: i) Low priority given to safety; ii) Poor attitude of contractors and laborers towards OHS; iii) lack of competent manpower to enforce regulations; iv) lack of safety promotion; and v) poor health and safety management systems.

Keywords- construction safety, hazards, safety and health standards, construction, accident

I INTRODUCTION

The construction industry is an important sector that contributes to the socio-economic development of a nation through building infrastructures and providing employment opportunities. Over the last few decades a high rate of urbanization, the construction of hydropower projects, and the development of infrastructures such as roads and bridges has increased the number of construction activities in Bhutan [1]. However, the construction industry is characterized by hazards, not only to the health of employees but also the general public. The possibility of fatality is five times more likely than in the manufacturing industry [2]. According to ILO (1999), the construction industry in developing countries is ten times more dangerous than in industrialized countries [3]. Similarly, Priyadarshani (2013) illustrated that Lopez Valcarcel (1996) estimated approximately 350,000 workers die every year due to work accidents, and of these, 60,000 occur in the construction industry worldwide [4]. Construction accidents in India contribute to 16.4% of global occupational fatalities [2].

Accidents and diseases cause many human tragedies, demotivate workers, disrupt site activities, delay work progress and have adverse effects on the overall cost, productivity and image of the construction industry [5].

The scenario in Bhutan is the same as in other developing countries. The construction industry contributes to 60% of workplace accidents compared to manufacturing (33%), mining and quarry (5%), and trading and services sectors (2%) [6]. However, in Bhutan, there have been limited or insufficient studies conducted on the OHS practices and challenges faced by the construction industry. Therefore, this study aimed to determine those practices and challenges, and make recommendations for improvement to the relevant stakeholders.

II CONSTRUCTION SAFETY

Throughout the world, the construction industry has the reputation of being one of the most hazardous. The working
conditions and the environment - such as working at height, excavation, confined spaces, machinery, noise, dust, and equipment - are more perilous given the temporary nature of the work. According to OSHA, one in five workers’ deaths in the United States (US) will occur in the construction sector, and in 2015 it was reported that - of 4379 worker fatalities in the US private sector - 21.4% (937) were in construction [7]. However, as previously stated, the situation is far more austere in developing countries [3].

According to OSHA [7], falling from heights is the leading cause of accident in the construction industry in the US (38.8%), while other causes of fatalities include being struck by objects (9.6%), electrocution (8.6%), and getting caught in or between machinery (7.2%). OSHA has identified the ten leading factors that prevent fatalities in the construction business: fall protection, hazard communication, scaffolds, respiratory protection, lockout/tag out, powered industrial trucks, ladders, machine guarding, electrical wiring, and general requirements [7]. Similarly, in 2015/16 in the UK, non-fatal injuries due to “slip, tip and fall” made up 23% of injuries; lifting and handling 22%; falls from height 19%, and being struck by objects, 11% [8]. Workplace injury and illness are the result of unsafe conditions - such as those relating to machinery - as well as management influence (latent conditions), and defective tools and equipment. Additionally, unsafe acts by the workers - influenced by individual characteristics such as behavior, skills, knowledge, and physical and socio-physical health - contribute to workplace accident and injury.

Studies have illustrated that deficiencies in risk management contribute to 84% of workplace accidents in the construction sector in Britain, followed by problems arising from workers (70%), shortcomings of equipment and Personal Protective Equipment (PPE) (56%), workplace issues (49%), and suitability and conditions of materials (27%) [9]. That employers, employees and society pay a high price regarding construction is clear; thus, safety awareness among construction industries has been increasingly realized and emphasized over the past few decades [2].

2.1 Construction safety in developing countries

Given the nature of the industry in developing countries, and the lack of technical knowledge and capabilities in identifying existing and potential hazards in the workplace, construction is far more hazardous. According to Larchar and Sohail[10], pertinent issues existing in the construction sector in developing countries included: no proper safety net or system to protect workers, use of poor quality hand tools (which increases the risk of injury), failure to include safety mechanisms at the time of design and planning, unclear or undefined roles and responsibilities of all the parties involved, and the lack of participation of workers in the health and safety issues [10].

Similarly, lack of safety awareness, insufficient safety regulations, poor technical knowledge and capability, ineffective implementation or enforcement of safety standards, and poor attitudes towards safety and health are also common in developing countries. Zeng et al (2008) listed twenty five factors related to the poor elements of construction safety management in China, as shown in Table 1 [11].

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Factors</th>
<th>Sl. No</th>
<th>Factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Poor safety awareness of firm’s top leaders</td>
<td>14</td>
<td>Ineffective operation of safety regulation</td>
</tr>
<tr>
<td>2</td>
<td>Lack of training</td>
<td>15</td>
<td>Lack of technical guidance</td>
</tr>
<tr>
<td>3</td>
<td>Poor safety awareness of project managers</td>
<td>16</td>
<td>Lack of strict operational procedures</td>
</tr>
<tr>
<td>4</td>
<td>Reluctance to input resources for safety</td>
<td>17</td>
<td>Lack of experienced project managers</td>
</tr>
<tr>
<td>5</td>
<td>Reckless operation</td>
<td>18</td>
<td>Shortfall of safety regulations</td>
</tr>
<tr>
<td>6</td>
<td>Lack of certified skill labor</td>
<td>19</td>
<td>Lack of protection in material transportation</td>
</tr>
<tr>
<td>7</td>
<td>Poor equipment</td>
<td>20</td>
<td>Lack of protection in material storage</td>
</tr>
<tr>
<td>8</td>
<td>Lack of first aid measures</td>
<td>21</td>
<td>Lack of teamwork</td>
</tr>
<tr>
<td>9</td>
<td>Lack of rigorous enforcement of safety regulations</td>
<td>22</td>
<td>Excessive overtime work for labor</td>
</tr>
<tr>
<td>10</td>
<td>Lack of organizational commitment</td>
<td>23</td>
<td>Shortage of safety management manual</td>
</tr>
<tr>
<td>11</td>
<td>Low education level of workers</td>
<td>24</td>
<td>Lack of innovation technology</td>
</tr>
<tr>
<td>12</td>
<td>Poor safety conscientiousness of workers</td>
<td>25</td>
<td>Poor information flow</td>
</tr>
<tr>
<td>13</td>
<td>Lack of personal protective equipment</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


However, the construction industry’s appalling health and safety record is a worldwide problem, affecting both developed and developing countries [10]. The literature review indicates that most construction industries in developing countries will be
affected by some or all of the factors shown on Table 1. These factors are critical and must be addressed in order to improve health and safety. Developing strategic approaches to tackle problems associated with OHS is one of many approaches.

2.2 Construction Safety in Bhutan (practices and scenario)

According to the 2017 Asian Development Outlook report, “Bhutan is the fastest growing economy in Asia”, and its economy is expected to grow from 8.2% in 2017 to 9.9% in 2018 [12]. With the rapid economic expansion in the last decade, construction has become one of the fast-growing industries in Bhutan. The construction of hydropower plants, particularly, is one of the driving forces for this rapid growth in the economy.

Currently, there are four major hydropower plants under construction. Bhutan has only developed 5% of 30,000 megawatts of hydropower capacity [12].

Additionally, the rate of urbanization in Bhutan is escalating. The World Bank estimates the urbanizing rate at 5.7% per year from 2000 to 2010, which was the highest among the eight south Asian countries [13]. In 2010, it was estimated that 34.8% of the population living in urban cities had increased to 39.4% by 2016 [14]. The rate of urbanization from 2010 to 2015 was estimated at 3.7%. Urbanization is associated with an increase in infrastructure development activities, such as construction of residential and commercial buildings, and roads. Therefore, the construction industry has simultaneously boomed with the increasing growth in urbanization [15].

However, as in all countries, the construction sector imposes a high risk of accident and injury due to the risky nature of the work and the industry’s structural and organizational challenges for risk management. The dangerous nature of construction in Bhutan is characterized by its labor-intensive immigrant workforce that has little or no knowledge about health and safety standards. The contractors, with the exception of those working in hydropower plant construction, do not make the effort to train or educate their workers regarding OHS. Studies show that human error contributes to 90% of workplace accidents [16].

Accordingly, considering the current situation in Bhutan where there is a lack of training in OHS, it is reasonable to assume that the rate of accident and work-related illness in the construction trade will only increase.

The Department of Labor reported that in 2015-2016, the industry contributed to 60% of workplace accidents [6], as illustrated on Table 2. The frequency of accidents in hydropower plant constructions was 58.7%, and 8.3% in other construction activities (e.g. residential, road, and bridge constructions). The highest number of accidents in the construction sector was reported in 2013/14 and 2012/13, though there was no significant variation from 2012 to 2016. However, the Department of Labor also finds that many accidents go unreported and the statistics presented here could be just the tip of the iceberg. As previously stated, one in five US workers’ deaths will occur in the construction industry [7]; similarly, the number of fatal accidents in construction in Bhutan is very high, as shown on Table 3: twenty one as compared to a total of three in manufacturing and other industries. However, accidents resulting in partial disability were slightly higher in the manufacturing sector.

### Table 2: Numbers of workplace accident

<table>
<thead>
<tr>
<th>Sector</th>
<th>Fatal</th>
<th>Total Disability</th>
<th>Partial Disability</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction</td>
<td>4</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>Hydropower</td>
<td>17</td>
<td>3</td>
<td>11</td>
<td>31</td>
</tr>
<tr>
<td>Construction</td>
<td>1</td>
<td>1</td>
<td>18</td>
<td>20</td>
</tr>
<tr>
<td>Manufacturing and Production</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mining and Quarry</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Trading and Services</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>

*Source: Annual Report 2015/16, Department of Labor, MoLHR, 2017*

### Table 3: Accident trends

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatal</th>
<th>Total disability</th>
<th>Partial disability</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012 - 2013</td>
<td>18</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>2013-2014</td>
<td>30</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td>2014-2015</td>
<td>17</td>
<td>1</td>
<td>11</td>
</tr>
<tr>
<td>2015 - 2016</td>
<td>21</td>
<td>3</td>
<td>12</td>
</tr>
</tbody>
</table>

*Source: Annual Report 2012/13, 2013/14, 2014/15 and 2015/16, Department of Labor, MoLHR*

Globally, falls from heights and getting struck by object(s) are two of the leading causes of accidents in the construction industry. According to the Department of Labor’s record for 2015-16, these factors also contribute significantly to workplace accidents in Bhutan, with approximately 8% caused by falls from heights and 33% by falling objects, as illustrated in Figure 1[6].

![Figure 1: Main cause of accidents](image)

For an industry which has already been grappling with quality issues for decades, safety issues pose yet another challenge for Bhutan’s construction sector. Most of the workers employed in the construction projects in Bhutan are sourced from neighboring India. According to the Department of Labor (Labor Net System), as of June 14, 2017, there were 57,663 immigrant construction workers. They are either unskilled or semi-skilled without certification from recognized training institutions, and
are most of the time learning “on the job”. The literature review shows the construction industry in India contributes to 16.4% of fatal occupational accidents worldwide [2]. Similar alarming statistics can be expected from Bhutan if the importance of OHS policies and procedures continues to be overlooked.

In addition to a largely unskilled labor force, the issue is further complicated by the workers’ mobility and the short duration of construction projects. These factors make it difficult to implement comprehensive health and safety awareness campaigns. Construction firms face numerous other problems as well: most of them are small-sized and poorly equipped, skilled certified workers are not readily available for employment, competitive tendering does not give priority to safety, and there is a lack of well-trained safety professionals - as well as a lack of general safety awareness. As such, concerted efforts from the government as well as the private parties are required to promote health and safety on construction sites.

2.3 Administration of construction safety in Bhutan

The foundation of Occupational Health and Safety principles was laid with the enactment of the Labor and Employment Act (LEA) 2007, which demonstrated a commitment to ensuring a safe and healthy workplace. The Ministry of Labor and Human Resources (MoLHR), particularly the Department of Labor (DoL), spearheaded labor protection regarding working conditions in the country. Chapter nine of the LEA empowers the MoLHR to implement health and safety procedures in all workplaces, and employers are responsible for guaranteeing a safe and healthy workplace through eliminating and providing education about occupational hazards. Furthermore, regulations regarding OHS were promulgated in 2012 via the Regulation on Occupational Health and Safety for Construction Industry 2012 and the Regulation on Occupational Health, Safety and Welfare [15]. The regulations cover a range of standards, from general requirements for construction safety to specific requirements regarding construction activities, such as excavation and tunneling works, scaffolding, transport and earth moving equipment, personal protective equipment, noise, heat and illumination standards. Fire, electricity and machine safety standards are also covered as it is the general standard across all industries.

The Department of Labor is responsible for creating suitable working conditions in workplaces. It delivers its service through three regional offices: the site office for the Punatshangchu hydro construction project in Punakha, its regional office in Phuentsholing and its headquarters in Thimphu. The primary function of the department is to prevent, protect and promote health and safety in the workplace through formulation of policies and standards, and to provide advice, education, and enforcement of the OHS standards [17].

On the other hand, the Construction Development Board (CDB) is responsible for policy development and the determination of the legal existence of construction companies in the country. Specifically, the board provides industry support, promotes technology development, undertakes manpower development and launches awareness initiatives focusing on health and safety. Today, there are about 200 large, 437 medium and 3555 small contractors registered with the CDB [18].

2.4 Education and Training

Education and training play a crucial role in fostering safe work methods in workplaces. Through training and education, workers develop a positive health and safety culture [19]. Spangenberger et al. (2003) found that lost time due to injury among the workers who were well-trained in health and safety laws was significantly lower than for those who were not [20]. Training programs could help companies in effectively carrying out health and safety initiatives, establishing a positive safety attitude, and integrating safety with other goals, e.g. quality [20]. According to Tam et al. (2004), falls from heights and injuries caused by falling materials could easily be prevented by implementing training programs to construction employees [21]. Ganguly (2011) suggests that about 90% of workplace accidents are due to human error, which can occur at any time during decision making or execution of a task. Training is the key to avoiding human error [16].

2.5 Occupational Health and Safety management system

Occupational Health and Safety Management System (OHSMS) is a coordinated and systematic approach for managing health and safety risks. OHSMS helps organizations to continually improve their safety performance and compliance with health and safety legislation and standards. According to ILO (2001), having a sound safety management system will not only reduce work-related accidents and illness, but also promote business efficiency. Likewise, Haslam et al. (2016) stated that organizations with a proactive OHS management system enjoy higher profit margins and achieve lower accident rates. OHSMS provides measurable systems that can verify the OHS performance and meet the legal requirements [22].

A study conducted in China found that a large number of recorded accidents and lenient legal enforcement in the construction industry were due to poor safety management [23]. The study recommended that integration of Occupational Health and Safety Assessment Series 18001 (OHSAS 18001) with the ISO 9001 (quality management system) could reduce workplace safety issues. S.X. Zeng et al. (2008) indicated that construction projects are prone to occupational accidents which can be caused by members of the supply chain - from management to workers - as well as by the working environment and work-related stress to meet targets, costs, quality, and time [23].

2.6 Personal Protective Equipment (PPE)

Using appropriate Personal Protective Equipment (PPE) will protect and reduce employee exposure to hazards when engineering and administrative controls are not feasible, or ineffective (HSE). PPE includes items such as protective helmets, eye protection, high-visibility clothing, safety footwear, safety harnesses and, in some cases, respiratory protective equipment. A study conducted in Addis Ababa, Ethiopia, found 60% less injuries among the construction employees who used PPE compared to those who did not [24]. The study also illustrated some of the leading factors for not using PPE: discomfort, and poor knowledge on the usage and importance of PPE [24]. According to Tanko and Anigbogu (2012), supervision
as well as checking and properly maintaining/replacing PPE were important procedures to improve PPE use on construction sites [25]

III METHODS

3.1. Design

In Bhutan, a qualitative cross-sectional study was undertaken to investigate the health and safety practices and challenges in the construction industry. Interviews and questionnaires were the means of gathering data. Participants first completed a written questionnaire, then took part in a face-to-face, semi-structured interview with the researcher. In both the questionnaires and the interviews, participants were asked semi structured, open-ended questions. These two methods were chosen because it was felt they would elicit the most meaningful and accurate information.

The primary data were collected via interviews using survey tools, while secondary data were obtained from the relevant authorities and agencies, such as the Ministry of Labor and Human Resources. The primary data were collected from three target groups, who are shown along with the main objectives on Table 4.

3.2. Sample

For the purpose of this study, a non-probability sampling method was adopted. The subjects were selected before the data collection specifically relevant to the study (Ahuja, 2011). The sample consisted of 119 respondents from the two categories. 114 respondents were workers from construction companies (20 from private companies, 3 from government-owned companies, 81 from a hydropower plant construction company, and 10 from a residential construction company), and 5 officials from the regulating agencies (3 respondents from the Ministry of Labor and Human Resources and 2 officials from the Construction Development Board). Three hydropower plant construction sites - one at Trongsa and two at Wangduephodrang - and one residential and commercial building site in Thimphu were chosen as subjects for the study. Accordingly, this sample represents the residential, commercial and hydropower plant construction models in Bhutan.

IV ANALYSIS

4.1 Awareness and knowledge on health and safety

This study found that only 31.3% of workers are aware of the challenges of OHS implementation at their levels;

- To learn what practices and standards are being followed at their respective companies.

Regulating agencies/Implementers

- To understand their roles as implementers;
- To learn what challenges they face at the level of implementation;
- To learn what they feel are the main reasons for OHS non-compliance.

Workers at the Construction site

- To gauge their understanding of OHS
- To learn a) whether they are provided with PPE, and b) if so, why they avoid PPE.

Table 4: Target group and objectives for sampling

<table>
<thead>
<tr>
<th>Target group</th>
<th>Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td>Construction Companies</td>
<td>• To know their perspective on the existing OHS rules and regulations;</td>
</tr>
<tr>
<td></td>
<td>• To obtain an overview of the</td>
</tr>
</tbody>
</table>
OHS policy and safety rules of their company. Also, 44.4% of construction workers were aware of the accident reporting system and their duty with regards to health and safety in their workplace. 38.2% of workers indicated that they are aware of the importance of housekeeping, and 51.5% indicated they are aware of the prevention of hazards. 43.8% of workers are aware of safety representatives at their workplace and 61.1% of workers had undergone either an orientation program or some training on health and safety. However, it was found that the workers from hydropower construction and Construction Development Corporation Limited (CDCL) are more informed and aware of health and safety at their workplace compared to those from private construction companies. The details are shown on Table 5.

4.2 Safety representative

The study also found that all the hydropower construction sites, as well as CDCL, had nominated safety representatives, while none of the privately owned construction companies did. However, only 43.8% of workers from the hydropower and CDCL are aware of the fact that they have safety representatives in the workplace.

4.3 Personal protective equipment (PPE)

Most construction companies said that they were issued with PPE; however, this was limited to helmets and rubber boots. The hydropower construction companies and CDCL were the only ones who had the whole range of PPE. 65.3% of workers have a good understanding regarding the use of PPE and its appropriateness as shown on Table 4. The majority of workers with knowledge about PPE work in hydropower construction and CDCL.

4.4 Induction & Training on OHS

The study indicates that besides the hydropower companies and CDCL, only 4 privately owned construction companies conduct orientation and training on health and safety. 61.1% of workers have attended an orientation program and training on safety at the workplace out of the 114 workers who were interviewed.

Table 5: Number and percentage of workers aware of safety factors (n=114)

<table>
<thead>
<tr>
<th>Safety factors</th>
<th>Number</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aware of OHS policy and safety rules</td>
<td>45</td>
<td>31.3</td>
</tr>
<tr>
<td>Aware of hazards at their workplace</td>
<td>64</td>
<td>44.4</td>
</tr>
<tr>
<td>Awareness of PPE used</td>
<td>94</td>
<td>65.3</td>
</tr>
<tr>
<td>Awareness of accident reporting system at their workplace</td>
<td>64</td>
<td>44.4</td>
</tr>
<tr>
<td>Understanding of their role on safety and health</td>
<td>64</td>
<td>44.4</td>
</tr>
<tr>
<td>Understanding of the importance of housekeeping</td>
<td>55</td>
<td>38.2</td>
</tr>
<tr>
<td>Aware of hazard prevention</td>
<td>74</td>
<td>51.4</td>
</tr>
<tr>
<td>Awareness of safety representative in the workplace</td>
<td>63</td>
<td>43.8</td>
</tr>
<tr>
<td>Attended an orientation program and training on safety</td>
<td>88</td>
<td>61.1</td>
</tr>
</tbody>
</table>

4.5 Challenges

The study found that workers’ non-compliance in using PPE is a major challenge. It was observed that the workers needed to be reminded to use and monitor PPE. It was also found that despite companies providing PPE and the workers understanding its importance, there was a failure to consistently use PPE. It was implied that PPE was uncomfortable and hindered their work performance.

A positive aspect found regarding CDCL was its aspiration to take a lead role in health and safety in the construction sector. Though the company faces many constraints such as lack of manpower and shortage of funds, they aim to be the leading agency on health and safety. Furthermore, with the growth of the organization, they plan to outsource OHS training and management.

Inadequate education and awareness of health and safety were the main factors contributing to the poor safety culture, mostly in the private sector. In some cases, workers are unable to understand the simple safety signs displayed at their work site, while at many others safety signs are conspicuously absent. Some workers indicated the importance of their wages compared to working conditions - they do not realize the fatal consequences of poor occupational health and safety practices.

4.6 Occupational Health and Safety administration

Although the Ministry of Labor and Human Resources - particularly the Department of Labor - attempts to enforce OHS standards, it faces many challenging constraints. The study found that the department is hindered with a lack of capacity - both in terms of know-how and resources - in order to enforce OHS. This is the prevailing challenge, and is exacerbated by resistance from within the construction industry to implement OHS practices. According to this study, the dominant factors contributing to the inadequate practice of OHS standards in the construction industry included limited knowledge regarding health and safety, resistance by employer and employees, the turbulent nature of construction work, and the limited capacity of those attempting to implement OHS - both within the industry and concerning government authorities. For details, refer to Table 6.
The lifespan of the construction project creates significant challenges to the implementation of OHS practices. Most construction projects are completed within 6 months to 2 years, except for hydropower plants. In residential construction OHS is even less apparent, with many worksites overlooking the appointment of safety officers or OHS representative(s), let alone a safety committee.

### Table 6: Contributing factors for poor safety and health practices

<table>
<thead>
<tr>
<th>Dominating factors</th>
<th>Hindrance to good OHS practice</th>
<th>Challenges</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Failing to comply with OHS legislation</td>
<td>1. Large number of workers in construction sectors are foreign workers</td>
<td>1. Resistance from employers and employees to adopting safety standards at workplace</td>
</tr>
<tr>
<td>2. Failing to instill safety behavior</td>
<td>2. Construction period (the short-term nature of construction projects)</td>
<td>2. Limited capacity of employers and managers to implement the OHS legislation</td>
</tr>
<tr>
<td>3. Employers not committed to creating a safe and healthy construction site (not fulfilling legal obligation)</td>
<td>3. Capacity of employers to implement OHS at site</td>
<td>3. The nature of the construction</td>
</tr>
</tbody>
</table>

### V DISCUSSION AND RECOMMENDATIONS

#### 5.1 Safety Representatives

The involvement of workers and their representatives in dealing with OHS issues and practices in the workplace is considered to create a positive health and safety culture [19]. It encourages their commitment to health and safety practices. Section 166 of the Labor and Employment Act 2007 required all workplaces to have a health and safety representative. The representative will act on behalf of all workers to consult and raise issues pertaining to OHS. However, it was found that none of the private construction companies participating in this study have any health and safety representatives. Similarly, though the hydropower plant constructions and CDCL have safety representatives, just over a third (43.8%) of the participants are aware of necessitating the presence of safety representatives.

The temporary nature of work that is peculiar to the construction industry was found to be the fundamental reason in not demanding and necessitating safety representatives. The short duration of construction projects was also associated with hiring temporary staff or workers in the company, especially in the small and medium scale construction companies. Such companies do not feel the obligation necessary to develop their human resources. Although the larger construction companies deploy safety representatives, they are generally ill trained, or have limited knowledge about health and safety. It is of critical importance that these representatives are well trained and that their training is regularly updated.

#### 5.2 Capacity building of managers and supervisors

One of the most effective ways to improve health and safety conditions at construction sites is in educating those involved in construction planning and managing [26]. According to Enshassi et al. (2008), the rate of injury among workers will decrease if supervisors were well trained, as they play a vital role in the workers’ safety.

As it stands, though the Labor and Employment Act 2007 and Regulation on Occupational Health, Safety and Welfare 2012 requires companies to train their own workers, the MoLHR has been actively training both public and private sector companies.

This study observed that, overall; companies do not take OHS issues seriously. Previous studies have shown that making supervisors more responsible in the supervision of safety at their workplace reduces accidents. Therefore, it is recommended that the MoLHR strictly enforce training for managers and supervisors, as well as workers, in OHS policies and practices. Managers and supervisors should also be made more responsible and accountable for safety issues in the workplace.

#### 5.3 Cost of workplace accident and injury

Worldwide, workplace accidents and injuries are significantly more common in the construction sector than in other industries [27]. It was estimated that construction site fatalities contribute to 30% of all workplace injuries, killing about 108,000 workers on construction sites every year [27]. In the UK, it was reported that for 2014/15, there were 69,000 work-related illnesses and 65,000 injuries in the construction sector, leading to 1.7 million working days lost [28]. The total economic cost of workplace injury and work-related illness in construction in 2013/14 was estimated at £0.9billion (£0.5 billion injury, £0.4billion illness), accounting for around 7% of the total cost across all industries (£14.3billion) [28]. The cost of workplace injury and illness includes direct and indirect cost: direct costs include workers' compensation payments, medical expenses, and costs for legal services, while indirect costs comprise training, replacement employees, accident investigation, implementation of corrective measures, productivity loss, maintenance of damaged equipment and property, and absenteeism [27]. According to Umar (2017), studies have shown that indirect costs are 11 times higher than direct costs. Any untoward accident at any construction site can immediately impact the workers’ morale, induce a negative corporate image and lead to extensions and delays of the project due to work rearrangements [29]. This can also lead to poor performance and decreased productivity.
In case of disability and death, workers’ compensation can have huge financial implications including the cost of recruiting and training new personnel. The iceberg model of costs of accidents and diseases precisely illustrates how, generally, employers only factor in the obvious costs incurred by accidents and diseases at work - essentially, the “tip of the iceberg”, while the bulk of expenses lies hidden [30]. HSE also indicated that the burden of accident-cost is higher on workers than on the employers and government [28].

Occupational Health and Safety, while essentially dealing with the interest of laborers, can also be cost saving for the construction company proprietors. They need to be convinced that investing in health and safety is in fact worthwhile from an economic perspective. According to the Department of Labor, the workers’ compensation cost in the construction sectors accounts for 90.2% of all the industries over the past four years, as illustrated on Table 7. Thus, cost-reducing effects of OHS can be documented, well-planned and systematically carried out. OHS measures can create economic returns that are greater than the monetary investment.

<table>
<thead>
<tr>
<th>Year</th>
<th>Total</th>
<th>Construction</th>
<th>Percent</th>
<th>Other industry</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012/13</td>
<td>5434616.0</td>
<td>5194979.0</td>
<td>95.59</td>
<td>239637.0</td>
<td></td>
</tr>
<tr>
<td>2013/14</td>
<td>14797822.0</td>
<td>14408702.0</td>
<td>97.37</td>
<td>389120.0</td>
<td></td>
</tr>
<tr>
<td>2014/15</td>
<td>5208536.0</td>
<td>3012536.0</td>
<td>57.84</td>
<td>2196000.0</td>
<td></td>
</tr>
<tr>
<td>2015/16</td>
<td>11535059.0</td>
<td>10750560.0</td>
<td>93.20</td>
<td>784499.0</td>
<td></td>
</tr>
</tbody>
</table>

*$1 = Nu: 64 (rough conversion). Source: Department of Labor, Annual report

5.4 Labor Motivation and training

It was observed that although some construction companies provide safety training and PPE, most of the workers refuse to comply. This demonstrates the fact that it is not only those at the management level who require a more in-depth understanding, training and observation of safety and PPE, but those working at the ground level – the workers themselves – who are directly at risk. This is a challenge as the laborers are very mobile, working temporarily, and further burdened with low literacy levels; hence, there is a paramount need for behavioral interventions. [31] suggests behavioral interventions may include education, persuasion, providing incentives, coercion (creating expectation of punishment), training (skill development), restriction of options, modeling (providing examples) and enablement (reducing barriers and increasing means).

5.5 Capacity Building

Over the last several decades, Bhutan’s construction industry has boomed skywards. During that time, Bhutan has heavily depended on foreign workers from neighboring countries, especially India. Today, the majority of the workforce in the construction sector is made up of immigrants. While they have undoubtedly contributed to Bhutan’s development, such an immigrant labor force has unfortunately contributed to poor work practices. This “borrowed work culture” is one of the major challenges for implementing OHS in the construction sector in Bhutan.

There are several vocational training institutes that are run by the MoLHR. As these institutes produce more competent technical graduates who are equipped with “hands-on” safety knowledge, the safety culture in Bhutan should also undoubtedly improve. Although CDCL is actively trying to employ technical graduates from the vocational training institutes, the reliance on foreign workforce is still a reality.

Additionally, many young Bhutanese jobseekers are still culturally opposed to the reality of seeking and working as “blue-collars”. With such a barrier, they eventually become “drop outs” who discontinue their vocational education. The MoLHR along with the Ministry of Education – should ensure these technical graduates are provided for with further education opportunities, and assist them by integrating them into the mainstream employment market. At the level of implementation, the MOLHR urgently needs to build their own human resources and expertise in campaigning for OHS and its rigid implementation.

5.6 Enforce OHS legislation strictly and penalize the defaulters

It is surmised that if stringent OHS laws are in put into place and higher penalties are levied at employers, they will become more conscious of health and safety as they will realize noncompliance with OHS standards will impact them financially and affect the overall health and image of their companies.

5.7 Collaboration among implementers

To the CDB’s refresher courses that are conducted regularly, sound value could be added by involving the MoLHR representatives, to impart their knowledge and skills regarding OHS. This would prove to be both beneficial and cost saving for both organizations. The MoLHR could further liaise with the CDB to expedite the license renewal of good performers, and to deregister repeat offenders.

5.8 Personal Protective Equipment

There is a pressing call and an urgent need for greater understanding among both companies and workers that PPE is not a solution, but a prevention tool – that wherever possible, it is better to try to eliminate the hazard rather than adopting a reckless attitude. However, the working conditions in construction - despite preventative measures in work design and project planning - still require workers to use PPE at all times. As discussed, workers strongly resist the use of PPE, performing jobs without safety gear with the justification that it hinders their performance and makes them feel uncomfortable. It must be noted that, considering the absence of risk assessment at the workplace, safety gear plays a most crucial role in determining the level of injuries in Bhutan. In hindsight, it can be assumed that a majority of the workplace accidents that resulted in
fatalities could have been prevented if the workers had been wearing and observing PPE practices.

5.9 Workers, Welfare, Facilities and First Aid

Work in the construction industry involves a lot of manual or physical activity. It is also hazardous and unhygienic. Welfare facilities include the provision of safe drinking water, washing, changing rooms, rest rooms, facilities for preparing and eating meals, and transport facilities, which can all help to reduce fatigue and improve workers' health. Simple measures such as keeping first aid boxes within easy reach can be lifesaving. Consequently, providing good welfare facilities not only boosts workers’ welfare, but can also increase efficiency.

Lingard (2002) demonstrated the positive impact of a 24-week experiment that assessed the effects of first aid training on the motivation of construction employees. The author found the general OHS behavior and risk control behavior of the participants improved, and the training enhanced their motivation to avoid occupational injuries. This suggests that implementing a similar first aid training program in the construction industry in Bhutan could have a positive and preventative effect, and could complement traditional occupational health and safety training programs.

5.10 Learning from best practices

OHS is a brand-new concept in Bhutan, hence gaining the acceptance at the level of implementation will be a formidable task. The private construction companies may always prioritize other areas over health and safety, and if they have to incorporate it into their working system, they will look for the best practices that have worked in the country. The government-owned companies like CDCL are currently in a better position to take a leading role, not only in the mechanization of construction but in safety practices as well. Homegrown examples should be more adaptable and successful in the long run. Donor-funded projects in Bhutan are usually handled by external agencies; one such example is the Dai Nippon Construction (DNC), a Japanese company undertaking projects funded by the Government of Japan. DNC is an exemplar of best health and safety practices, despite its projects being time-bound and temporary. It also employs local staff for the duration of its projects. Good OHS practices may be promoted and passed on if CDCL accords priority to employing workers who have prior experience with DNC.

VI CONCLUSION

This paper has comprehensively addressed the state of OHS practices in the Bhutanese construction industry. It has discussed in detail the many challenges the industry faces, from the lack of policy to the harmful attitudes of construction workers themselves. Finally, it has delivered recommendations for improving OHS awareness and implementation in Bhutan based on best practices in similar countries.

The review of the literature showed that Bhutan is not unique in confronting these issues. Developing countries lag behind industrialized countries in the implementation of OHS in construction, and as a result, these industries remain more dangerous for their workers. In accordance with previous studies identified herein, this study found that the major gaps in workplace health and safety in Bhutan are lack of competent manpower, inadequate OHS training, poor health promotion, lack of safety data on construction sites, and lack of an organized safety management system.

This study has only discussed the OHS issues in the construction sector. Therefore, to obtain a more holistic view of the country, there is a need for more research into OHS in other sectors. Another challenge this study faced was the lack of available data; thus, it is recommended more studies are conducted as the reporting systems improve over time.

Despite the limited data, however, the methodology utilized by this study has revealed pertinent information that has in turn provided a platform for basic recommendations to be given. These have been discussed in detail. They include, but are not limited to: improved collaboration between OHS implementers, less reliance on a foreign workforce through the provision of support and incentives to Bhutanese jobseekers, and ensuring OHS representatives are present on all sites. Perhaps most important, however, is the education and training component - not only for the workers, but their managers and supervisors, who must be held accountable for workplace safety. This study clearly demonstrates that while the use of PPE plays an important and necessary role, education is undoubtedly the key to preventing workplace injuries and death.

In summary, Occupational Health and Safety is a relatively
new concept in Bhutan, and the biggest challenge is to shape
the safety culture through behavioral change, of employers as
well as workers. The gains are mutual — workers are assured
of a risk-free environment and management enjoys a healthy
reputation. There is no doubt that the concerned agencies are
taking the right steps towards realizing better OHS awareness
and practice, but even with the best of intentions on the part of
the implementers and the government at large, the execution
will take time. Until then, at the ground level, the practice must
take precedence; but adopting these practices will be
prioritized only when owners of construction companies realize
building a safer work culture is of significant benefit to all.

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AUTHORS

First Author – DekiPelzomDukpa,MBA, MIPH,
MBBS, pelzomd@gmail.com

Second Author – PhuntshoDendup, MSc. Occupational and
Environmental Health, Department of Labour, Thimphu, Bhutan,
phuntshodendup@gmail.com

Correspondence Author – –
DekiPelzomDukpapelzomd@gmail.com