International Journal for Multidisciplinary Research (IJFMR)
E-ISSN: 2582-2160 ● Website: www.ijfmr.com ● Email: editor@ijfmr.com

Safety Condition Analysis on Construction Site in Dhaka City

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Abstract:
This paper investigates the different safety measures for mischances in building projects to minimize accidents. An investigation technique, comprising a literature review and a field think was utilized to achieve the investigation objectives. The field survey includes a designed questionnaire that was managed through a convenience sampling procedure inside the Dhaka division and excels software utilized for the analysis. The field study uncovers diverse control measures input and their rate of utilization on building projects. On the other hand, the writing overview sheds light on the sorts of mischances in building projects and their individual control measures with strategies for accident prevention. Recommendations based on the findings of the two types of surveys are outlined in the paper.

Keywords: Safety performance (Scaffolding & Excavation), construction Industry, Bangladesh.

1. Introduction

The construction sector plays an important role in the economic growth and development of Bangladesh. Despite this, we are lagging behind in creating safe workplaces for our construction workers But the construction industry stands out from other businesses as having one of the most elevated laborer damage and casualty rates[1]. The development comprises a really little rate of the general workforce. However, the rate for both deadly and non-fatal mishaps causing passing, wounds, and sicknesses surpasses that of numerous other industries[2]. The development industry has the foremost fatalities of any other industry segment for numerous nations of the world and right now for Bangladesh, its casualty rate is the moment biggest as it was falling behind the articles of clothing segment[3]. Numerous considers have appeared that a reasonably huge rate of development mischances seem to have been disposed of, diminished, or maintained a strategic distance from in case basic security methods were connected at the destinations and the laborers were trained and made mindful of the security dangers show within the destinations[4]. Construction safety (the halfway stage between a wrapped-up plan and a completed building) is to a great extent the obligation of the owner/developer/contractors and other location experts[5]. The victory to an extent depends on the perplexing arranging and choices with respect to the security measures that are made on location. Most developmental mishaps result from essential root causes such as the need for legitimate preparing, insufficient authorization of security, risky gear, risky strategies or sequencing, risky location conditions, not utilizing the security supplies that were given, and a destitute state of mind towards security [6]. Regularly times these security measures are horribly ignored and safety laws are abused within the destinations causing undue fatalities.

1.1. Background of this Study

Construction is one of the world's greatest and speediest developing industrial segments. It is, in any case, one of the foremost unsafest businesses. At slightest, 108 thousand laborers are slaughtered on location each year, which speaks to almost 30% of all words related passings. The dangers are 3 to 6 times more likely than in any other occupation[7].

In Bangladesh, this industry is developing exceptionally quickly. It speaks to 9 percent of Bangladesh's net household item (GDP) and utilizes more than 2.6 million individuals. This industry in Bangladesh is worth 900 billion Taka or US $12 billion (BBS 2013)[8]. There are more than a thousand companies in Bangladesh. Who is included within the development trade[9].

According to Occupational Safety, Health, and Environment (OSHE), 147 construction workers were killed in 2016. The trend is similar to that of the past, with the Bangladesh Institute of Labor Studies (BILS) reporting that there was a total of 1,196 deaths in the construction industry between 2005 and 2016, resulting in an average of approximately 100 deaths a year. The two most common reasons behind these deaths are falling from a height and electrocution. The rate of injury is also high, with BILS reporting approximately 100 injuries in 2016. Construction workers also suffer from various construction-related health hazards, including breathing problems, hearing loss, and skin diseases[10][11].

Another research will look into safety management in Malaysia's building industry. The sector has made a substantial contribution to the country's economic progress. Accidents will occur if construction safety management is not done consistently, affecting the country's economic growth.[12].

Every year, millions of construction industry accidents occur throughout the world, resulting in worker damages and injuries as well as economic losses[13]. The purpose of this research is to identify and assess safety management in construction projects in order to minimize and regulate construction workers' health and safety (H&S).

1.2. Research Significant

Construction mischances have been causing numerous human tragedies, the misfortune of life, efficiency, and delayed ventures. The most reason for selecting this point required for improving safety performance within Dhaka city other reasons would be:

- The lack of studies about the safety issues of construction experts in Bangladesh particularly in Dhaka city.
- To provide a few ways to assist companies in progress safety performance on the construction sites.

2. Methodology

Strategy stream chart (see figure 2.1) which included keywords for the conclusion step, beginning with destinations, and writing audit with keyword alteration the survey to suit the development ventures in Dhaka city, and conducting plan on the three portions of the respondents, to be specific. Proprietors, experts, temporary workers, moreover survey plans depend on the common of work and issue security within the development ventures in Dhaka city, to information examination there is three sorts of investigation in this investigate included. Microsoft excel, and score and many questions examination independently, at last conclusion and proposal.

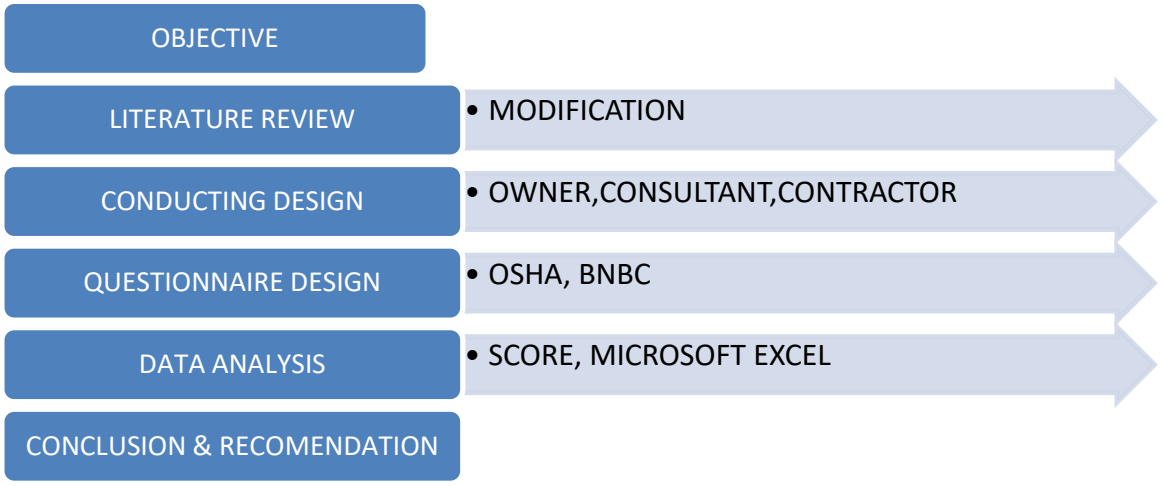

Fig 2.1: Methodology flow Chart

3. Results

3.1. BNBC rules for scaffolding:

67.42%Construction industry follows the BNBC rules for scaffolding on construction site, but 32.58% construction industry ignore the BNBC rules on construction sites. we get this result from that survey. The table is given below:

Table 3.1: The scaffolding questionnaire results in a total of 24 sites (BNBC rules).

Questionnaire	Yes%	No%
Ensure the bamboo poles are strong enough for work.	95.8	4.2
Check the cross-bracing is it 6mm or not.	91.67	8.33
Ensure the poles are securely lashed together or not.	75	25
Check deterioration of tying ropes and rotting planks time to time during the construction period	33.33	66.67
Ensure the scaffold dismantled after used piece by piece.	58.33	41.67
Ensure the holes in the wall that filled up with the same materials as that of the wall.	75	25
Check the crash striking its not be allowed.	45.83	54.17
Check the horizontal and inclined bracing is it 3m or not.	70.83	29.17
Ensure the nails and similar projecting objects have to be removed or hammered down into the timber component of the entering and shuttering materials immediately after stripping off.	100	0
Check the formwork should be strong and rigidly braced so as not to bulge or sag when concrete	87.5	12.5
Ensure the worker wears helmets, gloves, and heavy-soled shoes when removing the formwork.	20.83	79.17
Ensure the load capacity:	100	0
Ensure the bamboo size is vertically 75mm in diameter.	20.83	79.17

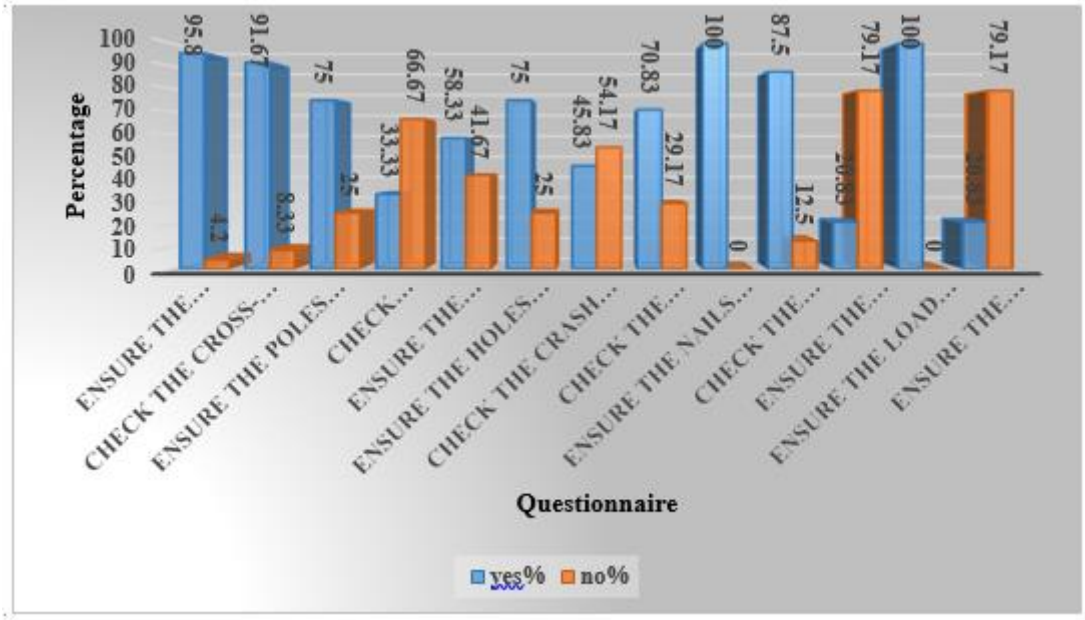

Fig 3.1: Scaffolding questionnaire results in a total of 24 sites (BNBC rules).

3.2. OSHA rules for scaffolding:

79.17%Construction industry follows OSHA rules for scaffolding on construction site, but 20.83% construction industry ignore OSHA rules on construction site. we get this result from that survey. The table is given below:

Table3.2: The scaffolding questionnaire results in a total 24 sites (OSHA rules).

Questionnaire	Yes%	No%
Ensure the Weight Capacity of the scaffold.	87.5	12.5
Ensure the Stability of the scaffold.	95.83	4.17
Check the Supervised Setup.	75	25
Ensure the Extra Precaution.	79.17	20.83
Ensure the Maintenance system is safe.	79.17	20.83
Ensure the scaffold materials.	75	25
Check the Scaffolding Inspection.	79.17	20.83
Ensure the Rigging Inspection.	83.33	16.67
Ensure the Rigging Protection.	62.5	37.5
Check the Diagonal Braces Instruction.	83.33	16.67
Ensure the Access.	79.17	20.83
Check the Power Line Distance.	70.83	29.17

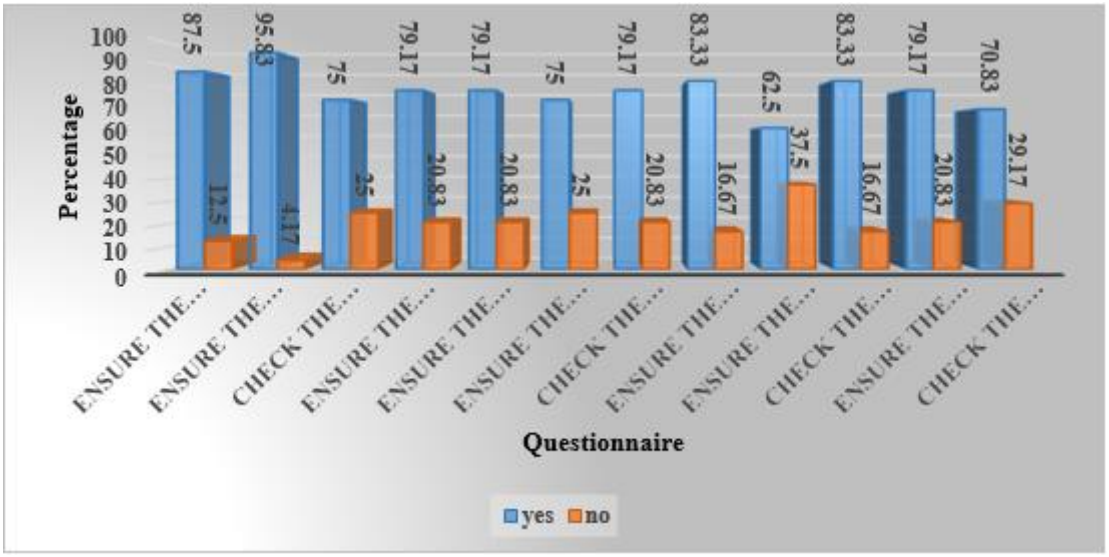

Fig 3.2: Scaffolding questionnaire results in a total of 24 sites (OSHA rules).

3.3. BNBC rules for excavation:

74.38%Construction industry follows BNBC rules for Excavation on construction site, but 25.62% construction industry ignore BNBC rules on construction site for Excavation. we get this result from that survey. The table is given below:

Table 3.3: Excavation questionnaire results in a total 24 sites (BNBC rules).

Questionnaire	Yes%	No%
Have to ensure that, excavation place is safe during construction.	100	0
Ensure the Ground water level.	87.5	12.5
The excavated site shall be properly fenced and warning signals.	100	0
Ensure the safe movements of workers.	37.5	62.5
Ensure then distance heavy equipment from the trenches.	79.17	20.83
Ensure the additional load due to the materials.	91.67	8.33
Direction of natural drainage shall be determined and also ground water pressure.	37.5	62.5
Ensure the solid material type.	83.33	16.67
Ensure the climate and other condition.	70.83	29.17
Ensure the materials, what types of materials they are using for excavating.	100	0
Ensure the prohibited materials.	41.67	58.33
Ensure the geological strata.	91.67	8.33
Ensure the law 4.3. (blasting notice)	87.5	12.5
Ensure the emergency exit.	100	0
Ensure that no one using flammable materials at work place.	83.33	16.67

Ensure the drink supply.	41.67	58.33
Ensure the air supply per minute for person.	75	25
Ensure the dead room and space per person.	41.67	58.33
Ensure the light supply during night.	91.67	8.33
Ensure the ground drainage system.	45.83	54.17

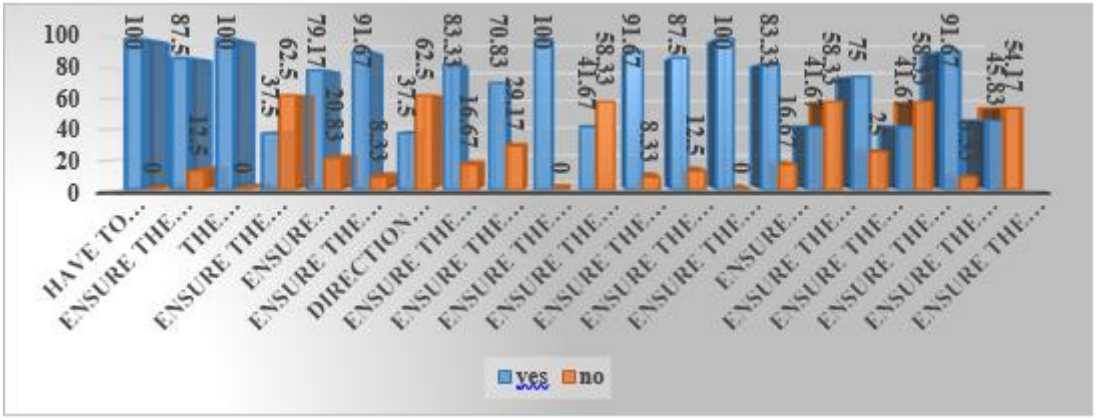

Fig 3.3: Excavation questionnaire results in a total 24 sites (BNBC rules).

3.4. OSHA rules for excavation:

The 75%Construction industry follows OSHA rules for Excavation on construction site, but 25% of the construction industry ignore OSHA rules on construction site Excavation. We get this result from that survey. The table is given below:

Table 3.4: Excavation questionnaire results in a total 24 sites (OSHA rules)

Questionnaire	Yes%	No%
Ensure that Keep heavy equipment away from trench edges.	100	0
Check surcharge loads at least 2 feet (0.6 meters) from trench edges.	91.67	8.33
Ensure where underground utilities are located.	91.67	8.33
Check low oxygen, hazardous fumes and toxic gases.	29.17	70.83
Ensure inspect trenches at the start of each shift.	87.5	12.5
Ensure inspect trenches following a rainstorm.	83.33	16.67
Ensure that worker do not work under raised loads.	29.17	70.83
Ensure the all excavations, including ladders, steps, ramps, or other safe means of exit for employees	83.33	16.67
Ensure that these devices must be located within 25 feet (7.6 meters) of all workers.	91.67	8.33
Ensure narrow underground excavation that is deeper than it is wide, and is no wider than 15 feet.	83.33	16.67
Check that there any unprotected trench.	54.17	45.83

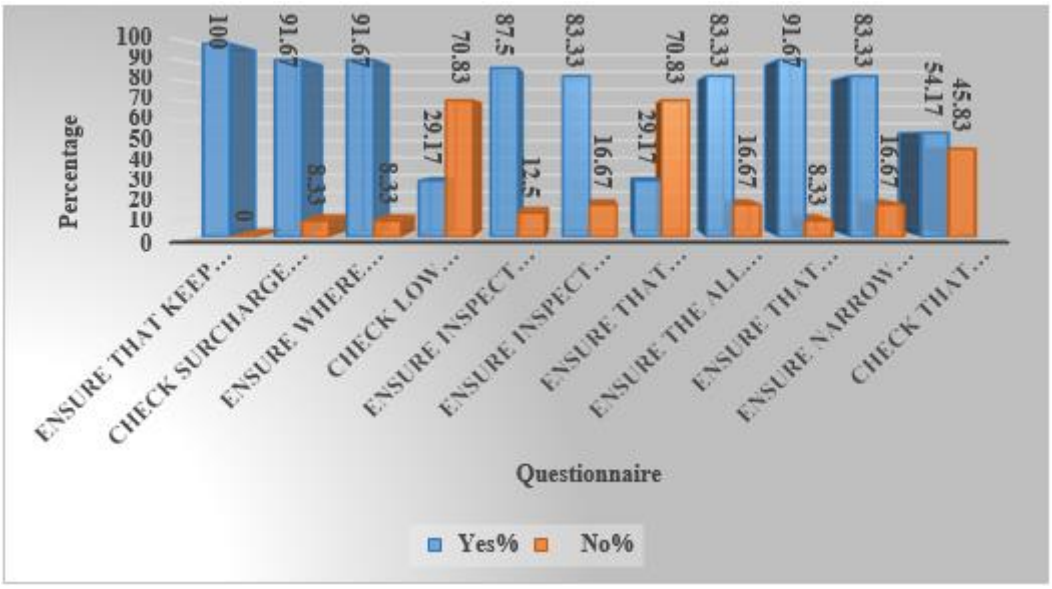

Fig 3.4.: Excavation questionnaire results in total 24 site(OSHA rules).

3.5. Per sites BNBC & OSHA rules percentages

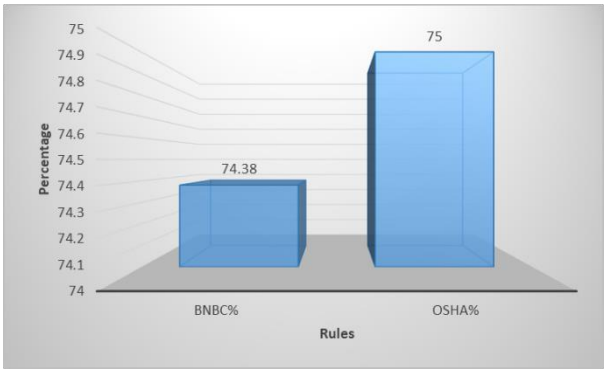

Fig 3.5: Percentage of sites followed by BNBC & OSHA rules for excavation from the survey.

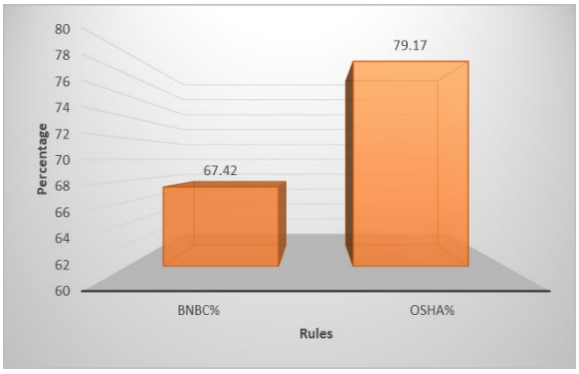

Fig3.6: Percentage of sites followed by BNBC & OSHA rules for scaffolding from the survey.

3.6. Per type of buildings BNBC & OSHA rules percentages

(a) For Residential Buildings:

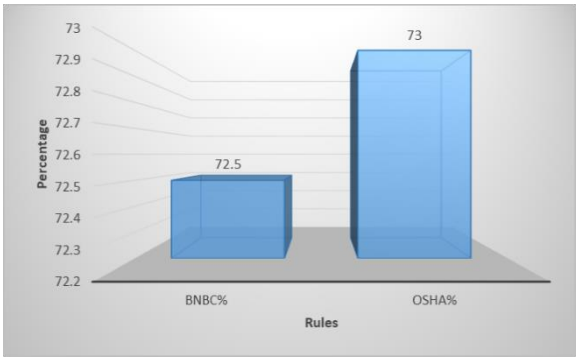

Fig 3.7: Construction firms follows BNBC & OSHA rules to build Residential buildings regarding excavation work.

Fig 3.8: Construction firms follows BNBC & OSHA rules to build Residential buildings regarding scaffolding work.

(b) For Commercial Buildings:

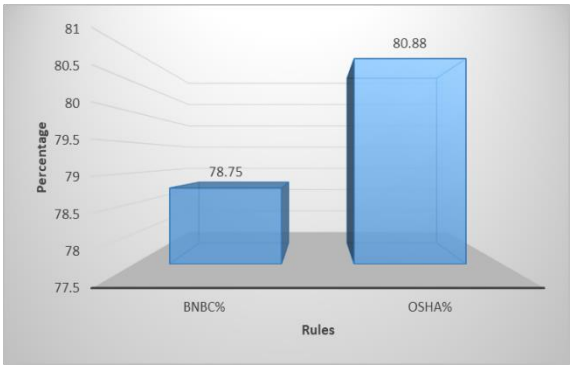

Fig 3.9: Construction firms follows BNBC & OSHA rules to build Commercial buildings regarding excavation work.

Fig 3.10: Construction firms follows BNBC & OSHA rules to build Commercial buildings regarding scaffolding work.

(c) For Industrial Buildings:

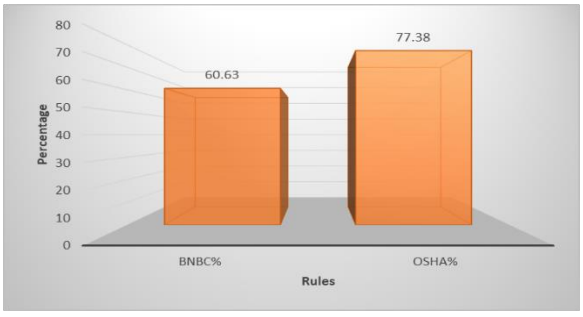

Fig 3.11: Construction firms follows BNBC & OSHA rules to build Industrial buildings regarding excavation work.

Fig 3.12: Construction firms follow BNBC & OSHA rules to build Industrial buildings regarding Scaffolding work.

4. Discussion

i. In our study, it was found that among 24 industries about 67% of industries followed the BNBC rules for scaffolding in construction, whereas 33% does not follow them. Among them,

- In more than 66% of industries did not properly maintain the deteriorated condition of working materials such as typing ropes and rotting planks during the construction period.
- About 42% did not ensure dismantling in a proper way.
- 54% of industries did not maintain framework materials quality.
- More than 79% of industries' safety materials such as helmets, gloves, and heavy-soled shoes were not provided to the workers.
- About 80% of industries did not follow the proper measurement of bamboo. (which is 75mm in diameter) for scaffolding.

ii. According to OSHA'S guidelines 79.17% of our investigated industries follow its rules of it, whereas 20.83% ignore them at their construction sites.

- It was found that 25% of the scaffold setup was not checked properly.
- And in 20.83% of cases, extra precautions were not provided.
- In 37.5% of cases rigging protection was not ensured.

- Power line distances were not checked in 29.17% of industries.
- And safety of maintenance system were not insured in 20.83% of industries.

iii. According to a study, In the case of excavation 74.38% of construction industries followed BNBC rules but in steel 25.62% ignore it.

- According to the BNBC rules 62.5% of industries did not ensure the safe movement of their workers.
- In 83.3% of cases ignore the additional load of workers.
- 62.5% of industries were not concerned about the natural drainage and water pressure.
- 29.17% did not ensure the climate and other conditions.
- In 58.33% of industries did not insure about the prohibited materials
- Essential materials were not provided to the worker in many construction sites, we found 58.33%.

iv. For excavation in our study 75% of construction industries followed the OSHA guideline whereas 25% ignore it.

- We found that very dangerous issues like low oxygen levels, hazardous flumes, and toxic gases were not ensured in 70.83% of industries.
- In 70.83% of industries workers worked under raised loads.
- Unprotected trench was not checked adequately in 45.83% of industries.

To reduce the accidental and fatal conditions on the construction site, the worker should be provided proper training on health and hazards. Supervisors and site engineers should be conscious of the BNBC and OSHA rules on construction sites, At the same time, authorities and government should take the proper measures on safety rules and regulations.

5. Conclusion

- Construction sector reflects the economical growth of a country. Security and safety is the foremost priority in the construction work place.
- Due to lacking of suitable work environment and proper knowledge regarding BNBC and OSHA rules on scaffolding and excavation in the construction sites several types accidents or deaths are recently increased in our country.
- In this study, it is found that most of the industries are not properly following the safety rules of BNBC and OSHA for their construction projects.
- On the existing safety procedures, regulations, policies, and accidents prevention methods related to the construction projects; there was a consensus among the respondents that implementation of safety regulation helps in reducing accidents.
- Construction professionals should play, more active roles in sustaining construction safety and in improving safety culture for construction workers. There was also a consensus between the respondents that responsibility for safety and health was only confined to construction work on site.

6. Limitation

To find actual scenery in the safety of construction sites in Bangladesh we need to conduct our survey in other divisions of Bangladesh also.

7. Recommendation

This study reviewed scaffolding & excavation safety officials in construction projects. The next studies may take electrification & fire safety to investigate the safety performance in the construction projects in Dhaka city.

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