



## EVALUATING COMPLIANCE OF CONSTRUCTION SITE SAFETY RULES AS A COMPLIMENTARY TOOL TO PROJECT COMPLETION WITHIN BUDGET LIMIT

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### ABSTRACT

The Systematic flow process necessary for a successful delivery of building project requires the collective wisdom of the construction team. Thus making construction site a very busy and dangerous place to work in due to the manifold of work items going on simultaneously. Owing to the risk inherent in construction sites, this study focuses on the evaluation of compliance to safety rules on construction sites that can serve as complementary tools in completing a building project within the budget. A project that is not completed on or within the budget limit is an indication of poor quality administration of construction process. The study adopts the focus group techniques to observe that inadequate safety protocols can increase insurance costs as a result of worker's compensation claims and law suits due to construction site accidents. The following were among the very quality result oriented construction sites safety rules. Wearing of Personal Protective Equipment (PPE) like the Hi-vis Vest, ear muffs and hard hats at all times, keeping a tidy site and prompt report of defective equipment. Not only does safety on construction sites protect workers, it also keeps the public safe and consequently helps to maintain the construction cost within approved limit.

**Key words:** Budget, lawsuits, Hi-vis vest

### INTRODUCTION

The construction industry is a dangerous environment and it has a poor health and safety record (Allan, 2013). Serious injury and death occur too frequently on construction sites due to construction activities. Most construction site activities are dangerous occupations that in too many cases, tradesmen and professionals get minor and/or fatal injuries.. Workers compensation Act (2011) is an important piece of legislation passed in order to provide for employees medical care, disability, rehabilitation and payment of death benefits for work-related injury or illness.

This Nigeria's Employees compensation Act empowers victims and families of employees involved in work-related injury or death to make claims. Worker's compensation claims and the possible lawsuits can drive up insurance costs in a manner that cuts deeply

into the budget. Internationally, construction workers are two to three times more likely to die on the job than workers in other industries while the risk of serious injury is almost three times higher (Brown, 2014).

Downtime is also costly. Time lost to finding a replacement to workers who cannot continue with their jobs as a result of construction site injury or death cuts a huge slice of the project's budget through loss of productivity, claims for compensation and high insurance premiums. These factors alone are enough to encourage the construction industry to focus on strict compliance to safety rules as complimentary measures to finishing a project on or under budget. Project Team Managers have cited budget overrun as one of the reasons for project failure. Improving safety measures on construction sites in order to protect the construction crew from injuries

whether fatal or minor will save a huge chunk of the budget otherwise spent on medical bills, compensation of downtime, extension of consummation dates, investigation, losses arising from closure of site, attending to burial ceremonies of a deceased staff and repairs to equipment will help in repairing high risk reduction equipments on construction site. Some of construction site risks faced by workers are working at height, moving vehicles, slips, trips and falls, others include collapse of building in part or whole electrocution, repetitive and excessive noise manual handling (lifting of materials and equipment), and overhead movement of materials through cranes.

Every employer is responsible for safe guarding the health and safety of their staff irrespective of the industry and the nature of work being performed (Jeson, 2018). Construction site safety measures decrease the risk of work-related injuries, accidents, decrease injuries to the public, reduce avoidable financial burden on the projects budget and also the need to ask for variation on administrative cost.

## MATERIALS AND METHODS

The focus group technique method was used to compare the effect of the two variables (Project budget and construction site safety rules) on each other-. To achieve results void of unbiased or preconceived notion, exploratory questions like"- Do you feel that non-construction site safety rules can negatively influence a project budget?" were among the questions in the open-ended questionnaire used. In addition to the questionnaire, empirical evidence were used to further explain and compare the results from respondents who were served the questionnaire.

## Causes of Construction Site Operation Injuries

Many including members of the public have been killed or injured as a result of construction activities. Many more have been injured or have developed prolonged illness (Ashworth, 2013).

The leading causes of construction site accident are due to a broad range of reasons and these include:-

### 1. *Falling from height and flying objects*

Falling through fragile roofs or roof lights and generally from elevated structures due to improper use of cords and lack of protective device. Slips and trips also occur as result of harmful site conditions. Falling from ladders, scaffolds are common places of fall if unprotected. Flying objects from cranes moving materials overhead could hit visitors to site or innocent passersby.

### 2. *Electrocution*

Contact with power lines and uncoated electric wires could cause electric shock and may lead to death. Defective equipment could cause serious injuries or death if not noticed and repaired.

### 3. *Vehicle Accidents*

Overturning vehicles and traffic collision as a result of poor traffic management or insufficient turning radius in busy construction sites could also lead to site injuries.

### 4. *Excavators, Lift Trucks or Dumpers*

Workers may sustain minor or fatal injuries if struck or hit by falling objects while any of the above machines/equipments are in operation.

### 5. *Collapsing Structures*

Collapsing structures either in parts or whole could cause fatal injuries by crushing or even burying unwary/unfortunate worker(s).

Other cause of construction site operation injuries include excessive noise from vibrating power tools as they delay in prompt hearing of falling elements.

The effect of these construction site injuries on the overall construction process are loss of human lives, demotivation of workers morale. Others are conflict with and among workers, loss of productivity which on the long run, have its cut on the projects budget as a result of claims, litigation cost and avoidable request for variation approval and payment.

### **Safety Cultures to Mitigate Risk at Construction Sites**

Construction workers are exposed to high risk environment and requires additional preventive construction site safety measures that can possibly mitigate risk that may lead to loss of lives or permanent disability. It is imperative therefore that every employer take appropriate precautions to safeguard workers and the construction site from avoidable risks, grief, compensation claims and litigations. Also, inadequate safety protocols can allow objects to fall on unwary bystanders, thus putting people not even connected to the project at high risk. While it is impossible to completely eliminate construction site risks, the following safety measures can mitigate and protect construction crew, visitors and the general public from fatalities.

#### **1. Safety Training Program**

On assumption of duty on any construction site, all workers must undergo Site-Specific Induction training to create awareness of high risk areas for conscious and efficient management of critical emergency situations. These training programmes expose all site workers to understand the need for regular site safety audit, access to safety points and develop a template to address potential risks with a view to minimizing the possibilities of all manner of site injuries.

#### **2. Wearing of Personal Protective Equipment (PPE)**

An employer is obligated to provide his staff with all the necessary PPE (Personal Protection Equipment) including safety harness, safety goggles, head protection gear and fall protection depending on the type of work. Jeson, (2018). Wearing of Hi-vis vest (High visibility Vest) helps to make sure each worker is seen, safety boots gives firm grip and protect the feet while hard hat protects the skull from flying and falling object. (Job site dress code PPE read) see symbols on Figure 1. These safety tips safeguards worker from electrical hazards and other construction sites injuries.



**Figure 1:** Construction Site Safety symbols.  
**Source:** Core safety Group Mumbai

#### **3. Signage Display at Conspicuous Points**

Safe Work Methods Statement (SWMS) must be prepared clearly displayed and made visible at all times as a way of implementing safety protocols for all high risk projects (Fig 2). This should outline risks involved, ways to avoid or manage them. The signage should clearly show the location of fire extinguishers, emergency exists, other amenities available on site, like first Aid facilities including a twenty-

four hours (24 hrs) emergency phone numbers. Selected safety signage are shown in Figure 2.



Figure 2: High Risk Zone

Source: Core safety Group Mumbai

#### 4. *Maintain Electrical Safety at Site*

The use of power and electrical transformers on sites of large and complex projects is inevitable, thus increasing the hazardous level of such a site due to the use of connecting flexible extension cords and power cables running through underground damp surfaces. To ensure electrical safety at construction sites therefore, site workers must maintain safe distance from cables and cords, wear rubber boots. In addition, overhead and underground cables must be insulated with sleeves while heavy electrical products that are not in use should be de-energized. More so, all extension cables must be used for the current not above their capacity. Above all, all identified defects must be reported and for no reason should any worker tamper with equipment he/she is not familiar with and the right equipment should be used for the right job.

#### 5. *Separate Entry and Exit Points*

A separate pedestrian entry should be established to separate pedestrian movement from vehicular traffic. To minimize the risk of accident at high traffic points, separate entry and exit points should be created for heavy machinery and vehicles with speed limit as shown in Figure 3.



Figure 3: Construction site speed limit

Source: Core safety Group Mumbai

#### 6. *Restricted Access and Site Safety Protocol*

To protect site equipment from damage or theft, restricted access into the site and site safety protocol should be encouraged during and after work hours to protect pedestrians from potential hazards and equipment safety. Authorized visitors may be allowed into the site but must strictly comply to all site safety protocols. To shield contractors from avoidable liabilities, litigations and security breach, due negligence, safety protocols must be religiously enforced.

#### 7. *First Aid*

Contractors at all levels (main or sub-contractors) as a matter of obligation has a duty to ensure that work is carried out as far as reasonably practicable without risk to health and safety (Simon 2010). For the construction industry it is best practice to provide one first aid officer per 25 workers. First aid kits and equipment should be placed in a safe and easily accessible area on the site.

#### 8. *Fall Protection*

Approximately 65% of all construction workers perform work on scaffold (Adekule, *et al.*, 2018). Falls are the leading cause of death in the construction industry. Employers are required to provide fall protection system to workers walking or working on unprotected edges or surfaces that are about 1.8m above the natural ground level. Workers should wear hard hats when working on, under or around scaffold been used by others. Workers should at all times maintain recommended load limit



on scaffolds, wear sturdy, non-skid, work boots and always use lanyards when working on scaffolds to prevent slips and falls. It is the responsibility of workers to secure objects from falling to minimize the risk of hitting on other people working below the height.

#### **9. *Observation of Chemical Storage Safety Requirement***

If chemicals are not properly stored, handled or used with optimum caution, they could cause asphyxiation, explosion, pollution or fire which may cause injuries of various magnitudes. To reduce the risk of spillage and fatalities, the use of high-quality and complaint open door storage solution to segregate chemicals is greatly encouraged.

#### **10. *Planning for Inclement Weather***

Unpleasant weather conditions can cause serious safety breach on site and delays. The construction crew and managers of construction site must have plans to accommodate the consequences of "Force majeure" with unambiguous instruction to stop work in the event of emergency beyond their control.

#### **Safe Site Effect On Total Project Operating Costs**

Safety on construction site is a very essential part of a project delivery process leading to finishing a project on or under budget. Downtime is obviously expensive due to time lost in repairing or replacing damaged equipment, supplies or injured worker through accident. Unsafe construction sites could affect the total project operating cost in a number of ways which includes:

##### **(1) *The Public***

Construction site is a very busy area where the general public come in to see and admire ongoing construction especially where the project is of public interest. Deficient safety

protocols can allow falling or flying objects to strike innocent on lookers or bystanders, thus putting those not directly involved in the project to avoidable high risk. It therefore means that as the site is been made safe for workers, it is equally made safe for the general public. Where the individual involved in an accident is not a staff, a lawsuit is likely.

##### **(2) *Time and Financial Loss Resulting from Site Accident***

When Site accidents results to injury (permanent disability inclusive or death), work stops and investigation begins leading to loss of man power that could have been put to work. Often, vehicles, equipment and materials supplied are damaged. These will require finances from the operating budget or variation for repairs or total replacement of both equipment or materials depending on the magnitude of the accident. In event that a worker is injured, treatment commences at the employer's cost and compensation claims will be involved where the accident results in permanent disability or death. Even where accidents do not occur, an unsafe construction site is a risk. Regulatory bodies require that specific standards of safety measures must be met on construction sites. The project delivery managers stand the risk of paying fines and penalties for failure to put safety measures in place. Providing and maintaining safety guidelines on construction sites protects the employers against this avoidable financial loss through payments of fines and penalties. The benefits of cost saving through the building of well articulate safety culture on construction site cannot be over emphasized.

#### **RESULTS**

A majority of respondents among the focus groups (site workers and construction team) who were interviewed reveled that most construction site owners do not prioritize safe measures. The results are often avoidable site



injuries, deaths, replacement of damaged equipment. Others are evacuation of rubbles and reconstruction of failed parts of the structure, payment of claims /compensation and downtime. The cost of these, take additional expenditure from the project budget.

### CONCLUSION

It is time to introduce site workers to training and induction to safety measures on site before the commencement of construction. It is equally pertinent for the employer to consciously examine construction sites to ascertain that all measures necessary to protect workers and ensure public safety are put in place. To strengthen the culture of safety on site as a means of reducing the rate of claims and compensation arising from injuries and death, safety requirements must be made a condition for employment, regular training of workers to ensure that everyone understands site safety recommendations and symbols, and workers should be encouraged by giving regular awards to those who make safety a priority through regular wearing of Personal Protective Equipment (PPE), Hi-vis vest, hard hat, keeping a clean site, following safety signs and procedures in addition to avoiding unsafe areas, reporting defective equipment to the appropriate quarters and keeping other safety measures as already outlined. Safe site measures reduces to the barest minimum cases of lawsuit, downtime, variation due to repairs, replacement of equipment, claims and compensation.

Safety on the construction site is felicitous to protecting employees, the public (site visitors/passersby) keeping the job running on time and completing the project within the budget.

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