

# Causes and Effects of Construction Accidents

# Kavya.K, T.Pradeep



Abstract: In a day to day scenario, the construction industry is the most developing sectors when compared to all countries. There are numerous reasons for accidents, and they result from the elements that happen in the workplace. These elements, in ideal conditions, can essentially build the likelihood of a risk getting to be operational and prompting a word related mishappenings. The site accidents are bound to happen when there are lacking organization arrangements, risky practices, and weak frames of mind of development workforce, poor administration responsibility, and deficient wellbeing information and preparing of laborers. The point is to locate the fundamental driver of accidents, places with the big event, perilous sorts of work, and so on, by factual examination. In light of that, a few enhancements are endeavored to propose better security for the executives later on. This paper found that the most significant accidents in the construction industry include fall from a height, fall from scaffoldings, and building collapse. Based on the study of past works of literature, the significant factors influencing construction accidents include technical causes, organizational causes, human causes, and environmental causes. The preventive measures taken by the construction industries are providing personal protective pieces of equipment (PPE's), conducting toolbox meetings and safety training to the workers. The violation of OSHA guidelines should be recorded and reported. Workers must be aware of the hazards and safety programs to prevent construction accidents.

Keywords: personal protective equipments, from height, fall from scaffoldings, building collapse, OSHA guidelines

## I. INTRODUCTION

The development business by its inclination is a perilous one. It is generally perceived as having high accident rates, which result in nonattendance from work, loss of profitability, perpetual inabilities, and even fatalities. Aside from causing human catastrophes, development accidents additionally postpone task advance, increment expenses, and harm the notoriety of the developer. Accidents rates in development keep on being a universal reason for concern. This worry is defended because development has the most elevated setback rates in numerous nations. The reason for the article is to distinguish and systematize the most significant factors and direct

causes that affect the event of accidents in the development business. Such investigation will empower the circumstances and logical results relations prompting an accident to be resolved, and demonstrate the headings for further investigate that would intend to create instruments to diminish the event of risks in work environments in the development business.

# Revised Manuscript Received on December 30, 2019.

\* Correspondence Author

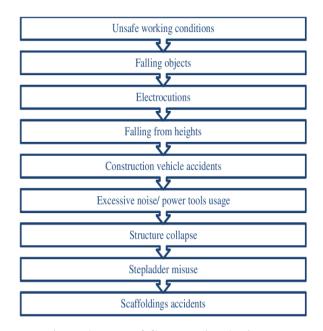
Kavya K\*, PG Scholar, Department of Civil Engineering, Kongu Engineering College, Perundurai Erode.

**Pradeep T**, Associate Professor, Department of Civil Engineering, Kongu Engineering College, Perundurai, Erode.

© The Authors. Published by Blue Eyes Intelligence Engineering and Sciences Publication (BEIESP). This is an open access article under the CC-BY-NC-ND license <a href="http://creativecommons.org/licenses/by-nc-nd/4.0/">http://creativecommons.org/licenses/by-nc-nd/4.0/</a>

#### II. TYPES OF CONSTRUCTION ACCIDENTS

Various sorts and reasons for an accident are distinguished by different researchers. Accidents do for the most part happen nearby, running from tumbles from statures/falling perils, blast, Vehicle accidents, fire flare-up, electric shock/electrical episodes, contact with electric flow, to fall of substantial articles during lifting. Be that as it may, recognized the most successive accidents like falls, versatile plant, falling material and breakdown, electrical accidents just as excursions. Aside from the event of accidents, HSE likewise distinguished the different sick wellbeing conditions that the laborers are presented to, which incorporate asbestos, manual taking care of, commotion and lastly, substance exposures. experiencing writing broadly, thirteen sorts (classes) of accidents was contrastingly distinguished. These are Fallrelated accidents; Contact with articles; Vehicle/machinerelated accidents; Lifting and taking care of items accidents; Explosions; Collapse accidents; Welding accidents; Drown/Asphyxiation accidents; Animal conduct accidents; Slip and Trip accidents; Victim of human hostility; Equipment/instruments related accidents; and Electrocution accidents. Besides, with the exploratory examination did by on the sorts and recurrence of accidents in the South-western conditions of Nigeria, four classifications of accident were most conspicuous which were contact with working devices, vehicle-related accidents, slip and outing, and fall-related accident, in spite of the fact that there are subtypes of accidents under every class. The various types of construction accidents are listed in figure 1.



**Figure 1 Types of Construction Accidents** 



### III. CAUSES OF CONSTRUCTION ACCIDENTS

Few accidents bring about just a minor seriousness while others are deadly. Factors, for example, time of the accident, day of the week, and season were not emphatically connected with accident severities. At the point when the variables influence the seriousness of accidents is surely known, high hazard elements can be singled out, and explicit preventive measures could be created .The seriousness of accidents were identified with factors including age, CNAE (National Classification of Economic Activities) code, size of the organization, length of administration, area of accidents, day of the week, long periods of nonappearance, deviation, damage, and climatic zones .The principle elements influencing

wellbeing execution to incorporate poor security attention to the top management, lack of training, poor wellbeing consciousness of undertaking managers, reluctance to include assets to safety, and reckless operations. The most successive accident types include: tumble from rooftop, floor or stage, contact with falling articles, tumble from the platform; and contact with moving pieces of a machine.

#### IV. FACTORS IDENTIFIED

The various accidents are identified. Based on the works of literature and OSHA standards the majors' accidents in the construction industry include fall from height; fall from scaffoldings, and building collapse accidents. The factors affecting these accidents are identified from the literature survey. The factors identified are shown in Figure 2.

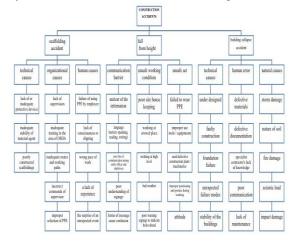


Figure 2 Factors Identified For Major Accidents

### V. DATA ANALYSIS

The questionnaire was prepared and the responses were collected from various people of construction sector. It was done by the means of

Google forms and the data were analysed by using Excel sheets.

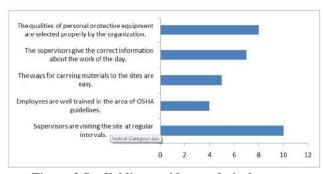


Figure 3 Scaffolding accident technical causes

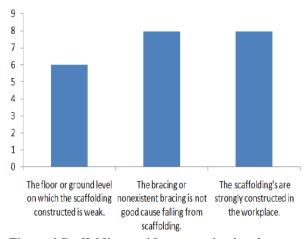


Figure 4 Scaffolding accident organizational causes

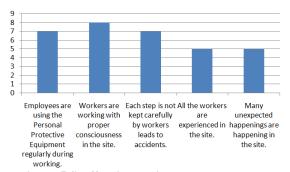


Figure 5 Scaffolding accident human causes

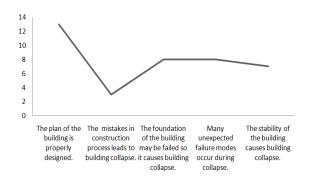


Figure 6 Building collapse accident technical causes



Journal Website: www.ijitee.org

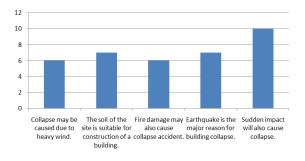


Figure 7 Building collapse accident natural causes

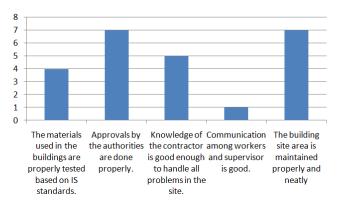


Figure 8 Building collapse accident organizational causes

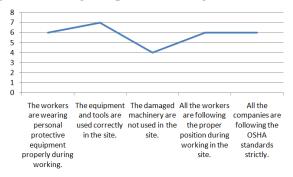


Figure 9 Fall from height accident Unsafe act

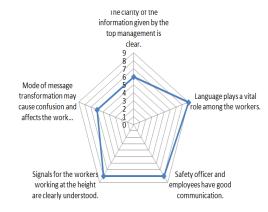


Figure 10 Fall from height accident communication barrier

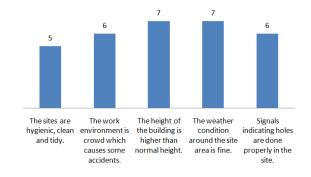


Figure 11 Fall from height accident unsafe working condition

# VI. RESULTS AND DISCUSSION

1	The floor or ground level on which the scaffolding constructed is weak	0.812	15
TI			13
2   Ine	bracing or nonexistent bracing is not good cause falling from scaffolding.	0.788	13
3 Th	e scaffoldings are strongly construction in the workplace.	0.835	16
4 S	upervisors are visiting the site at regular intervals.	0.812	15
5 F	Employees are well trained in the area of OSHA guidelines	0.659	3
6 TI	ne ways for carrying materials to the sites are easy.	0.753	9
7 Th	e supervisors give the correct information about the work of the day.	0.835	16
8	The qualities of personal protective equipments are selected properly by the organization.	0.859	18
9 En	nployees are using the Personal Protective Equipment regularly during working.	0.765	10
10	Workers are working with proper consciousness in the site.	0.871	19
11 E	ach step is not kept carefully by workers leads to accidents.	0.753	9
12 A	ll the workers are experienced in the site.	0.729	7
13 Ma	any unexpected happenings are happening in the site.	0.718	6
14 Th	e plan of the building is properly designed	0.906	20
15	There might be mistakes in construction process leads to building collapse.	0.553	2



### **Causes and Effects of Construction Accidents**

16	The foundation of the building may be failed so it causes building collapse.	0.847	17
17	Many unexpected failure modes occur during collapse.	0.835	16
18	The stability of the building causes building collapse.	0.741	8
19	Collapse may be caused due to heavy wind.	0.706	4
20	The soil of the site is suitable for construction of a building.	0.741	8
21	Fire damage may also cause collapse accident	0.776	12
22	Earthquake is the major reason for building collapse.	0.8	14
23	Sudden impact will also cause collapse.	0.718	6
24	The materials used in the buildings are properly tested based on IS standards.	0.718	6
25	Approvals by the authorities are done properly	0.753	9
26	Knowledge of the contractor is good enough to handle all problems in the site.	0.776	12
27	Communication among workers and supervisor is good.	0.447	1
28	The building site area is maintained properly and neatly.	0.776	12
29	The sites are hygienic, clean and tidy.	0.717	5
30	The work environment is crowd which causes some accidents.	0.717	5
31	The height of the building is higher than normal height.	0.741	8
32	The weather condition around the site area is fine.	0.706	4
33	Signals indicating holes are done properly in the site.	0.718	6
34	The clarity of the information given by the top management is clear.	0.768	11
35	Safety officer and employees have good communication.	0.847	17
36	Signals for the workers working at the height are clearly understood.	0.776	12
37	Mode of message transformation may cause confusion and affects the work progress.	0.776	12
38	The workers are wearing personal protective equipment properly during working.	0.8	14
39	The equipments and tools are used correctly in the site.	0.741	8

40	The damaged machineries are not used in the site.	0.729	7
41	All the workers are following the proper position during working in the site.	0.753	9
42	All the companies are following the OSHA standards strictly.  Language plays a vital role among workers	0.753	9
43	Language plays a vital role among workers	0.706	4

#### VII. DISCUSSION

The ranking for the parameters is done causes and effects of construction accidents. Ranking is done based on the RII values obtained from analysis. It clearly shows that the improper design may leads to building collapse, unconsciousness of the workers may leads to scaffolding accidents, lack of awareness about personal protective equipments may leads to falling from height accident.

### VIII. CONCLUSION

It is agreed that undertaking supervisors give more consideration to the significant variables distinguished in the investigation to enable them to diminish the recurrence of accidents. This paper found that the most significant accidents in the construction industry include fall from a height, fall from scaffoldings, and building collapse. These are identified based on the past works of literature OSHA guidelines statistics. The major factors causing these accidents are technical causes, organizational causes, human causes, and environmental causes. It is noted that the demonstrations of God are unavoidable, yet under escalated poor or antagonistic climate conditions, laborers can be pardoned from work, especially during an overwhelming storm. To prevent construction accidents,

various safety measures such as personal protective types of equipment (PPE's), toolbox meetings, safety training to the workers are introduced. The violation of OSHA guidelines should be recorded and reported. Safety personnel should be appointed in the sites to supervise the workers. Workers must be aware of the hazards and safety programs to prevent construction accidents.

## REFERENCES

- Fung et.al, (2009), "Developing a risk assessment model for construction safety", Int. Journal of Project Management, 28 (6), 593-00
- Gangolells, M. et. al. (2010), 'Mitigating construction safety risks using prevention through design', Journal of safety research, 41(2), 107-122.
- Camino Lopez. et. al. (2008) 'Construction industry accidents in Spain', Journal of Safety Research, 39(5), 497–507.
- Al-Tabtabai, H. M. (2002). Analyzing Construction Site Accidents in Kuwait. Kuwait Journal of Sci. and Engg. 29(2), pp 213–238.
- Aniekwu N. (2007). , A paper titiled Accidents and Safety Violations in the Nigerian Construction Industry", J. of Sci. and Tech., Vol. 27(1).
- Umeokafor, N. et.al (2014)., Compliance with Occupational Safety and Health Regulations: A Review of Nigeria's Construction Industry. Proceedings of the 3rd Int. Conference on Infrastructure Development in Africa. Abeokuta, Nigeria. 17th -19th March,



Journal Website: www.ijitee.org



- Williams, O. S., et.al. (2017), A Conference Proceeding of paper Contributions of Stakeholders, Construction Workers and Construction Site Environment to the Occurrence of Accidents in Nigerian Construction Sites: A Review. ASIA Int. Conference (AIMC 2017) 1-2 May. Tech and Society: A Multidisciplinary Pathway for Sustainable Development.
- Orji Solomon E., et.al. (2016). Accidents in Building Construction Sites in Nigeria; A Case of Enugu State. Int. J. of Innovative Research and Development, 5(4), 244–248.
- Health and Safety Executive (HSE) (2006). Health and Safety in Construction. Health and Safety in Construction HSG150, 141. Retrieved from http://www.hse.gov.uk/pubns/priced/hsg150.pdf
- Hovden, J., Albrechtsen, E., & Herrera, I. A. (2008). Is There a Need for New Theories, Models and Approaches to Occupational Accident Prevention? Safety Sci., 48(October), 950–956.
- Dumrak, J., Mostafa, S., Kamardeen, I. and Rameezdeen, R., (2013).
   Factors associated with the severity of construction accidents: The case of South Australia. Construction Economics and Building, 13(4), Pp.32-49.
- Arquillos, A.L. et.al. 2012. Analysis of construction accidents in Spain, 2003-2008. J. of safety research, 43(5-6), pp.381-388.
- 13. Tam, C.M., et.al. (2004), Identifying elements of poor construction safety management in China. Safety Sci., 42(7), pp.569-586.
- 14. Ahmed, S., et.al. (2018), February. Accidents on construction sites in Bangladesh: A review. In 4th Int. conference (ICCESD 2018) pp. 9-11.
- Kunal patel and priya patel, (2013), October. Measures to Prevent Accident at Construction Site. Int. Journal of Engineering Research & Technology (IJERT), 2(10), pp. 1276-1280.
- Lee BH, et al., (2018). Accidents in Construction Sites: A Study on the Causes and Preventive Approaches to Mitigate Accident Rate. INTI J. 2018; 1(3) pp. 1-12.
- Blank, V.L., et.al. (1997). the impact of advances in production technology on industrial injuries: a review of the literature. Safety Sci., 26(3), pp.219-234.
- Lopez, M.A.C. et.al. (2008). Construction industry accidents in Spain. Journal of safety research, 39(5), pp.497-507.
- Cheng, C.W. et.al. (2010). Characteristic analysis of occupational accidents at small construction enterprises. Safety Sci., 48(6), pp.698-707.
- 20. Choudhry, R.M. and Fang, D., (2008). Why operatives engage in unsafe work behavior: Investigating factors on construction sites. Safety Sci., 46(4), pp.566-584.
- 21. D.J. Edwards, J. Nicholas., (2002). The state of health and safety in the UK construction industry with a focus on plant operators Structural Survey, 20 (2), pp. 78-87.
- Nkem, A.N., Hassim, M.H. and Kidam, K., (2012). Relationship between Unsafe Acts/Condition And Accidents In Construction Company In Nigeria. Jurnal Teknologi, 75(6).
- Winge, Stig & Albrechtsen, Eirik. (2018). Accident types and barrier failures in the construction industry. Safety Sci. 105. 158-166. 10.1016/j.ssci.2018.02.006.
- 24. Bentley, T.A., Hide, S., Tappin, D., Moore, D., Legg, S., Ashby, L. and Parker, R. (2006) Investigating risk factors for slips, trips and falls in New Zealand residential construction using incident-centred and incident-independent methods. Ergonomics, 49, 62–77.
- Hallowell, M. (2010) Safety risk perception in construction companies in the Pacific Northwest of the USA. Construction Management and Economics, 28, 403—

