

Identification and Evaluation of the Accident Prevention Practices Utilized in the Zambian Construction Industry

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Abstract

The construction industry is a hazardous field, with a high risk of accidents due to the nature of the work involved. These accidents range in severity from minor to major injuries and even fatalities, leading to a growing need for occupational health and safety measures. This study therefore aimed to identify and evaluate the accident prevention practices utilized in the construction industry in Zambia. The study used a mixed-method approach that included semi-structured interviews and a survey questionnaire, with a sample population consisting of National Council for Construction (NCC) - registered local contractors in grades 1 and 2, including both employers (contractors) and employees (workers) working on construction projects in Lusaka, Zambia. The study found that common accident prevention practices in the Zambian construction industry included safety training and orientation, the provision and proper use of personal protective equipment (PPE), safety inspections, strict safety enforcement, and the provision of safe working conditions and environments. The research is essential in providing useful information for policymakers, stakeholders, and practitioners in the construction industry in Zambia, by identifying effective accident prevention practices that can be adopted to improve safety in the workplace.

Keywords

Accidents, Construction Industry, Preventive Practices, Occupational Safety and Health (OSH) and Personal Protective Equipment (PPE).

1. Introduction

The Economic Commission of Africa (2017) recognizes the importance of high-quality infrastructure development in promoting industrialization, structural transformation, and economic growth in developing countries. Zambia has shown a commitment to public infrastructure development through initiatives outlined in the Seventh National Development Plan 2017-2021 (Ministry of National Development Planning 2017). Over the past decade, the industry

has experienced consistent growth at an annual rate of 17.5 percent, which is likely due to increased investment from both the private and public sectors in infrastructure development (Ministry of National Development Planning 2017). The construction industry plays a vital role in the development of the Zambian economy and was recorded as the second highest contributor of the Gross Domestic Product (GDP) in the informal sector accounting for 27.4 percent (Central Statistics Office 2014). Public and private projects, which include the construction of roads, hospitals, schools and residential and commercial properties, are the main drivers of activity within the sector. The construction industry is a highly hazardous field due to the nature of the work involved, and accidents remain a major challenge on many construction sites with no signs of decreasing (Oni 2019). According to the ILO (2019), approximately 1,000 people worldwide die each day from occupational accidents, and an additional 6,500 people die from work-related diseases. It was further reported that there has been an overall increase in the number of deaths resulting from occupational accidents and work-related diseases, from 2.33 million deaths in 2014 to 2.78 million deaths in 2017. Accidents in the construction industry can vary in severity, with some causing minor or major injuries, while others can result in fatalities. Studies have shown that thousands of individuals are either seriously injured and left disabled or killed in construction industry accidents each year (Sabet et al. 2013).

This research highlights the significant role of the construction industry in contributing to the Zambian economy, despite the hazards involved in the sector. The objective of the study is therefore to provide insights into the accident prevention practices employed in the Zambian construction industry, with the aim of reducing the occurrence and severity of accidents in the field.

2. Literature Review

Many studies have provided definitions of an accident emphasizing the importance of recognizing and addressing potential hazards and unsafe conditions in order to prevent accidents from occurring. Robertson (2015) defines an accident as an undesirable incidence and unplanned event that could have been prevented had circumstances leading up to the accident been recognized and acted upon prior to its occurrence. While Dodo (2014) asserts that an accident is an unplanned event that has the capacity to cause injury or damage and is attributed to either unsafe acts or unsafe conditions.

2.1 Types of Accidents

The construction site has an incredibly high amount of activities taking place with everyone focused on the task at hand. In such an environment, accidents are prone to take place, some of the most common types of construction accidents include;

2.1.1 Construction Site Falls

Accidents resulting from falls include roof-related falls, crane falls, scaffolding falls, elevator shaft falls and falls resulting from holes in flooring and falling objects. Proper protection equipment such as safety belts, retaining belts, safety harness, and safety ropes are necessary to protect the lives of workers and to secure them against falling from heights (Kemei and Nyerere 2016). Scaffolds and ladders are a leading cause of fall accidents and have one of the highest injury rates (Jahangiri et al. 2019). Enshassi and Shakalaih (2015) in their study found that there are six main factors that cause scaffolding accidents and these are related to the erection, staff, loads, personal safety, workers' competencies and workers' behaviors (Enshassi and Shakalaih 2015).

2.1.2 Crane Accidents

The use of cranes is increasingly becoming common in the construction industry worldwide. While cranes have shown improvement along with technology over the years, crane accidents on construction sites still occur and result in injury or death. Crane accidents deaths can arise from a number of factors including; human behavior, inducting lightning, high winds, poor safety management, defective cranes, falls, electrocution and other hazards associated with working environments resulting in unsafe work procedures at heights (Zaini et al. 2020; Gharaie et al. 2015).

2.1.3 Electrical Accidents on Construction Site

Electrical-related accidents common to the construction industry include electric shock, electrocutions, power line contact and steam accidents. The risks of these hazards are heightened to workers who come in contact with exposed wiring, unfinished electrical systems and power lines while performing their job on scaffolding or cranes near

overhead power lines (Bhole 2016). In addition to the aforementioned types of construction site accidents, Hughes and Ferrett (2007) exemplify the following as accidents that occur in the construction industry:

- i. Coming in contact with moving machinery or material,
- ii. Being struck by a moving, flying or falling object;
- iii. Being hit by a moving vehicle;
- iv. Striking against something fixed or stationary;
- v. Being injured while handling, carrying or lifting objects;
- vi. Slipping, tripping and falling on the same level and/or from a height;
- vii. Being trapped by something collapsing;
- viii. Drowning or asphyxiating;
- ix. Being exposed or in contact with a harmful substance;
- x. Being exposed to fire or an explosion;
- xi. Getting in contact with electricity or an electrical discharge among other accidents.

2.2 Accident Prevention Practices

Accident prevention practices refer to policies and procedures put in place to limit and control exposure to risks so that accidents are prevented. These practices take into account the relationship between the workforce, tasks and workplace (Alli 2008; Wachter and Yorio 2014). Studies have shown that the specifics of accident prevention practices differ in accordance with the nature of the business. In the building construction industry accident prevention practices are so numerous and include some of the following:

2.2.1 Safety policies and procedures

Construction safety management is fundamental for organizations looking to prevent accidents in the workplace. This allows for safety planning which provides the details on all safety policies and procedures appropriate for recording any accidents, alerting management to possible risks and how to complete safety-related tasks (Priyadarshani et al. 2013). Additionally, this document also helps the employees understand the expectations of management consequently preventing any miscommunication and legal issues in the event of accidents (Bijelic et al. 2015). It should be understood that the construction industry is dynamic and constantly growing, hence organizations are advised to review their safety policies and procedures at least once per year. When and if any changes are made to the policies and procedures, it is imperative that the changes be communicated to the employees immediately.

2.2.2 Pre and post-employment physicals for specific positions

Some organizations tend to require employees who desire to occupy specific roles to undergo physical and mental screening before taking the job. This is done in order to ensure the mental and physical capabilities of the employees to perform the duties as the position demands. For instance, machine operators and truck drivers are required to undergo health screenings annually to continue working (Zhao 2019).

2.2.3 Regular training

Safety training is largely concerned with teaching employees the safe methods of carrying out their jobs and focusing on occupational hazards. This helps the employees understand the risks associated with their jobs and how they can minimize the chances of accident occurrence (Hallowell 2012; Demirkesen and Arditi 2015). Safety training may include the following: proper lifting techniques, importance and correct use of personal protective equipment, procedures for handling hazardous material, accident reporting and locations of emergency equipment like fire extinguishers.

2.2.4 Hire a safety officer

Construction companies are encouraged to get in the practice of hiring safety officers as their main focus is on safety and prevention of accidents. They are responsible for determining organizational risks, developing safety and wellness plans, implementing safety procedures and enforcement of the safety policies (Widajati et al. 2017). Safety officers concern themselves with identifying potential hazards by inspecting the workplace and reviewing accidents reports from previous years. Furthermore, safety officers ensure the organization complies with all the safety and health regulations of the state and industry.

2.2.5 Provide protective gear

Employers are required to provide the necessary safety gear and require the employees to use it appropriately. The personal protective equipment (PPE) provided depends on the nature of the work and the environment. PPE include but is not limited to reflective vests, helmets, goggles, gloves, waist belts, harnesses and foot protection (Ammad et al. 2020). Studies suggest that the employer should not just end at providing the protective gear but should extend this practice to include training the employees on the right ways to use the equipment. Additionally, employers can conduct unannounced inspections to make sure the employees are using their protective equipment appropriately (Ulang et al. 2014).

2.2.6 Housekeeping

Housekeeping is an essential accident prevention practice in the construction industry. Poor housekeeping can result in the creation of hazards and employees are very likely to slip on floors or trip over objects (Aboagye-Nimo and Emuze 2017).

The review of the literature undertaken aims to identify and describe the types of accidents that are common in the construction industry and the accident prevention practices that can be implemented to reduce these accidents. The significance of this study lies in the fact that the construction industry has a high rate of accidents, and these accidents can be fatal or cause serious injuries to workers. Therefore, it is important to understand the types of accidents that are common in the industry and the practices that can be implemented to prevent them from occurring. This can help to improve the safety of workers in the construction industry and reduce the number of accidents that occur.

3. Methodology

The aim of the study was to identify and evaluate the accident prevention practices used in the Zambian construction industry. To achieve this, the researchers employed a qualitative research method which involved semi-structured interviews with participants. The sample population was limited to NCC-registered local contractors in grades 1 and 2, with a focus on both the employers (contractors) and employees (workers) working on construction projects in Lusaka, Zambia. The sample size for the qualitative analysis was limited to 12 participants (Onwuegbuzie and Collins 2007), which is consistent with qualitative research methods to provide valuable insights into accident prevention practices used in the Zambian construction industry. The target group for the semi-structured interviews included senior site personnel, site engineers, project managers, project engineers and safety officers. Data was captured through audio recording and note-taking and was analysed using thematic analysis. Purposive sampling was used in this research in order to select people that are believed to be reliable and valuable and would provide as much insight as possible into the conduct of workers and employers with regard to the institution of accident prevention practices as the phenomenon under investigation.

4. Results

The interviews were conducted with 12 Engineering professionals from eight (8) NCC-registered local construction companies in grades 1 and 2 operational in Lusaka. The numbers of interviewees are as shown in Table 1.

Table 1. Number of respondents

S/N	Registered Grade of Contractor	Number of interviewees
1	Grade 1	8
2	Grade 2	4

4.1 Profile of Interviewees

Interviewees were carefully selected to represent the key professional players concerning occupational safety and health (OSH) in construction companies. The interviewees included four (4) safety officers, four (4) site engineers, two (2) project engineers, one (1) clerk of works and one (1) project manager. Respondents were asked how long they have worked in the construction industry and not particularly in the organization they currently work for. It was evident that the majority of the interviewees had over 6 years of work experience and were therefore expected to have better

knowledge of health and safety issues in the construction industry, and thus provided reliable information. The findings were as depicted in Table 2.

Table 2. Demographic profile of the interviewees

No	Position	Education level	Experience (years)
1	Project Engineer	MSc	20
2	Project Manager	MSc	16
3	Site Engineer	Degree	11
4	Site Engineer	Degree	10
5	Safety Officer	Diploma	10
6	Project Engineer	MSc	8
7	Site Engineer	MSc	7
8	Clerk of works	Degree	6
9	Safety Officer	Certificate	6
10	Safety Officer	Degree	4
11	Site Engineer	Degree	3
12	Safety officer	Certificate	2

4.2 Interviewee involvement in issues of OSH

This part of the interview was meant to establish how the respondents were involved with issues pertaining to OSH in their organizations. The results showed that generally all the respondents were highly involved in issues of safety as it hinged on productivity. Respondents echoed how productivity was directly linked to safety hence they all played a role in enforcing safety at the work site. Their involvement included regular safety sensitization talks, inspections and monitoring, enforcing compliance and the distribution of personal protective equipment (PPE).

4.3 Accidents recorded

Recording accidents is an important part of accident prevention as it allows for the identification of potential hazards and the implementation of measures to mitigate risks. When asked if accidents were recorded after they occurred on sites, interviewees did not have a unanimous response as some said yes and others were not sure about it at all. It was gathered that the largest recorded number of accidents in a period of one year was 8-10. These included various non-fatal accidents resulting in minor injuries and bruises. These accidents included slips and falls, cuts due to non-usage or wrong usage of PPE such as gloves. It was also gathered that a number of near misses had occurred on these construction sites.

4.4 Accident prevention practices

The interviews established that the accident preventive practices common to the Zambian construction industry included safety training and induction, provision and proper use of PPE, provision of safe and healthy working environments, safety inspections and enforcement. These preventive practices were further categorized into three (3) main groups namely; safety audits and inspections; shared expectations expressed among employers and employees; and lastly accident control measures. Safety audits and inspections at construction sites help to ensure the effectiveness of accident prevention methods during project operations. These essentially focus on the environmental aspect of the construction sites including elements such as housekeeping, equipment, tools and management systems. While shared expectations expressed help to shape the person's knowledge, motives, attitudes, skills, abilities and personality. Finally, accident control measures influence the behaviour of the workforce as they focus on activities such as putting on PPE, cleaning spills, adhering to procedures and many more.

4.4.1 Safety audits and inspections

This part of the interviews was meant to establish if the construction companies conduct safety audits and inspections. The interviewees were asked to state if their companies conduct safety audits and inspections and how often. The study found that all of the construction companies conduct safety inspections on their job sites, with varying frequencies ranging from daily to weekly while safety audits are conducted in only four (4) of the companies. The site inspections are regularly conducted and in some instances on impromptu basis by safety officers and other personnel directly involved with safety issues. While safety audits were said to be conducted by internal safety auditors.

4.4.2 Shared expectations in construction companies

In this part of the interviews, the respondents were asked if their companies expressed shared expectations among the employer, management and general workers in relation to OSH. Some of the sample responses registered by the interviewees include the following:

- *“All players in our organization are aware of what is expected of them with regards to safety for example, management provides a safe work environment and PPE while the workers are expected to use the provided PPE.”*
- *“Various functional departments among which is the safety department meet weekly and have review sessions where each department presents a summary of their operations. This allows for an open seating where shared expectations are expressed and later channeled down to the rest of the work force in each department.”*

The interviews showed that generally all the companies in question express their shared expectations and they understand their roles well enough and thus ultimately have good work systems.

4.4.3 Accident control measures

This part of the interviews was meant to establish the accident control measures applied in the construction industry. The interviewees suggested the following as the common accident control measures in the construction industry: safety training and induction, provision of PPE, proper use of PPE, safety inspections, sufficient safety enforcement and providing safe working conditions and environment.

5. Discussion

The findings of the study indicate that people are aware of accidents that occur on construction sites and this is important because it helps us to know what prevention practices need to be implemented for particular accidents. From the eight construction companies sampled during the study, it was gathered that the largest recorded number of accidents in a period of one year was approximately 8-10. These included various non-fatal accidents resulting in minor injuries and bruises. These accidents included slips and falls, burns, exertion, electrical hazards, and being struck by objects, cuts due to non-usage or wrong usage of PPE such as gloves. It is therefore important for employers to provide adequate training and equipment to prevent these types of accidents from occurring and to ensure that workers are using personal protective equipment (PPE) correctly. The study also inferred that a number of near misses and incidences had occurred on these construction sites. Research conducted by Namonje (2017) categorized the accidents common on Zambian construction sites into falls, cuts, burns, exertion, electrical, struck by, poisoning and classified them into minor, major and fatal. Additionally, the study identified inadequacies in reporting and investigating of accidents and near misses on construction sites. The finding of this study conforms with the findings of Mutwale-Ziko et al (2017) who established that despite most construction sites having formal systems of reporting, recording and investigating accidents as guided by organizational OSH policies, they have low levels of adherence to reporting of accidents, injuries, near misses and illnesses on site. The research results also agree with Tente (2016) who asserts that in a significant number of sites visited during her study conducted, there was an absence of accident reports being filed. Among the many accident control measures, the common ones that were cited in this study included; safety training, the provision of PPE and its proper use, safety inspections, sufficient safety enforcement and the provision of safe working conditions and environments. According to the research, stakeholders in construction companies tend to have shared expectations regarding certain aspects of safety, which primarily focus on the following areas: personal protective equipment (PPE); tools and equipment; scaffolds and ladders; fall protection; fire protection; and hoisting and lifting equipment. The study also established that stakeholders in construction companies generally have shared expectations regarding specific aspects of safety, which mainly revolve around the following areas: safe

and healthy working environments; provision of adequate and appropriate information, instruction, training and supervision; and safety and health standards and procedures.

6. Conclusion

The research identified and evaluated the accident preventive practices common to the Zambian construction industry as safety training and induction, provision and proper use of PPE, provision of safe and healthy working environments, safety inspections and enforcement. Furthermore, the study categorized these practices into three main groups for simplicity purposes namely: accident control measures, safety audits and inspections and shared expectations in the construction companies. It is important to note that the research focused on large construction companies, which may introduce a bias in relation to company size and safety practices. However, other studies, have suggested that company size is not necessarily a determinant of safety climate. Therefore, the findings of the study are still relevant and important for improving safety practices in the Zambian construction industry.

The low levels of adherence to reporting accidents, injuries, near misses, and illnesses on construction sites identified in the study are concerning. It is important for employers to create a culture of safety where workers feel comfortable reporting incidents without fear of retribution. This can be achieved through education and training, clear reporting procedures, and effective investigation and follow-up.

Overall, the study highlights the need for ongoing vigilance and improvement in safety practices on construction sites to prevent accidents and protect the health and safety of workers.

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