

An Investigation into the Causes of Accidents in the Construction Industry in Uganda

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Abstract

The Construction Industry in Uganda and other developing countries faces a wide range of challenges, one of which is the frequent occurrence of accidents in the work areas. This paper presents results of a research that concentrated on investigating causes of accidents on construction projects in Uganda.

During the last few years several accidents have occurred on various construction projects all over the country, some of which have been fatal. This has made the construction industry one of the high-risk industries in Uganda regarding the safety of workmen as well as property, yet there is increasing construction activity countrywide. In view of this spate of events, the need to develop strategies to abate accidents on construction projects and hence minimise re-occurrence was warranted.

This research was conducted in five selected districts in Uganda, and the findings reflect views expressed by several people directly or indirectly involved in the construction process.

Major causes of accidents identified in this research associated with construction projects include inadequate supervision, use of incompetent personnel and use of inappropriate construction techniques. Among the recommendations made for minimising and/or avoiding re-occurrence of accidents are review of the existing regulations, enforcement, sensitisation and training.

Keywords: *Accidents, Construction Industry, Enforcement, Safety, Training*

INTRODUCTION

General review

Cost, time, quality and safety are important characteristics of every project. For the construction industry in Uganda, there has been greater emphasis on the first three aspects at the expense of safety. Lack of adherence to safety requirements has led to increased exposure of workmen and the general public to risk situations on construction sites resulting in a high chance of occurrence of accidents.

Accidents include not only direct physical injury to persons or damage to property, but also short and long term effects or incidents due to other exposures on sites that affect the workers' health and physical well-being.

Background to the study

Over the last ten years or so the construction industry has thrived as a result of the liberalisation of the economy which has attracted both local and foreign investors. Construction of new structures (office complexes, industrial zones with factories and warehousing facilities, infrastructure etc.) and upgrading or remodelling the existing structures has become the order of the day. Therefore, the question of safety in construction can no longer be ignored and deserves due consideration.

However, in the recent past, fatal accidents have occurred due to the collapse of some structures at various sites in the country. These have been given wide publicity in the local and international media and have accordingly raised great concern and anxiety among the public. The notable accidents include

- the collapse of an excavation at a site on Plot 19, William Street, killing three workers while removing support bars of a reinforced concrete retaining wall. (The New Vision, Saturday, June 3, 2000);
- the collapse of a building at a car mart at the former Pulsations Club in Kabalagala trading centre on 11th May 1999, killing one worker. (The New Vision, Wednesday, May 12, 1999);
- the collapse of a foundation trench at a site along Pilkington Road, opposite National Insurance Corporation Building and Uganda Electricity Board District Office, on 31st October, 1997, killing four workers and injuring several others. (The New Vision, Saturday, Nov. 1, 1997 – “Kampala Building Buries 6, Kills 4”; The MONITOR, Saturday, Nov. 1, 1997 – “Six Buried Alive”); and
- the collapse of a suspended maxpan floor slab of a two-storeyed building at Buziga, 8 km along Kampala - Ggaba Road on 2nd November, 1997. The building, which had reached roofing stage, injured two workers. (The New Vision, Monday, Nov. 3, 1997 – “Another Building Collapses in City”).

This spate of events has raised a big outcry from the general public as to whether engineers and other people involved in the construction process are competent enough to undertake such projects. The public wants an assurance as to whether there are some measures being put in place to ensure safety of workmen and property. The authors' preliminary findings revealed that there is weakness in enforcement, and also ignorance of the importance of Safety and Health Regulations as stipulated in the Factories Act (1964) and the Public Health Act (1965), both of which need updating. More critical though, is the fact that many of the accidents in the construction industry arise from workers' negligence, ignorance and carelessness.

With the increasing construction activity prevailing countrywide, a study of the current safety practice in the construction industry was therefore warranted. This would enable the authors to establish the causes of accidents on construction projects from which strategies for improved safety practice would be developed. This is the purpose for which this research was conducted.

Objectives of the study

1. To determine the causes of accidents on construction sites and identify the present and potential safety hazards in the construction industry.
2. To analyse the safety measures used on construction sites in relation to existing safety regulations, design standards and code(s) of practice, and their impact on the safety of workers.
3. To develop an appropriate program/guideline for safety in the construction process.

Research questions

The following research questions were formulated to further examine the problem statement:

1. Is inadequate/faulty design the cause of accidents in the construction industry in Uganda?
2. To what extent does use of poor quality materials lead to the occurrence of accidents in the construction industry?

3. What is the effect of using inappropriate construction techniques in relation to safety on site?
4. How does inadequate supervision contribute to the occurrence of accidents on construction sites?
5. Are there any provisions to counter any possibility of occurrence of accidents on construction sites?
6. Do people adhere to the requirements of the Safety and Health Regulations?
7. How best can the occurrence of accidents in the construction industry be reduced?
8. What is the situation like in other countries?
9. What is the relationship between safety and productivity?

Scope of the study

The research covered five districts with relatively high construction activity. Emphasis was, however, put on public and private **building** construction projects which were randomly selected to study the extent to which safety is given consideration, the causes of accidents and adequacy of mitigative measures to the accidents. This was done by making observations on randomly selected projects in the five selected districts, administering questionnaires to people involved in the construction process and conducting interviews with several stakeholders in the construction industry. This paper presents some recommendations that have been proposed for achieving improved safety on construction sites.

Significance of the study

- 1 The research was expected to establish the causes of accidents in the construction industry in Uganda and the inadequacies of the mitigative measures.
- 2 The findings would assist in developing an appropriate guideline for construction safety practice for people engaged in the construction industry in order to minimise accidents.
- 3 The research was also expected to recommend improvements to the safety (and health) regulations currently in use.
- 4 It was expected to contribute to the knowledge of the future readership, and as a source of reference for further research.

LITERATURE REVIEW

Construction in Uganda

Ashworth (1994) states that the construction industry includes building, civil engineering and process plant engineering, and is concerned with the planning, regulation, design, manufacture, installation and maintenance of buildings and other structures. These elements are very critical in developing countries such as Uganda.

The Uganda National Association of Building and Civil Engineering Contractors (UNABCEC) is a sectoral association bringing together contractors, suppliers, and manufacturers of building and construction materials in the private and public sector in Uganda. In the UIPE Journal of April/May 1999, the Chairman of UNABCEC was quoted to have said that there are 250-300 registered construction businesses in Uganda. He further said that the total estimated annual turnover of the Uganda construction industry is about USD 800m - 1,000 m as compared to the UK industry with a weekly turnover of pound sterling 1 billion. The comparison we can draw from Wright (1997) is that the British construction industry contains 200,000 contracting firms of which 95,000 are private individuals or one-person firms.

According to Charlotte (1997), the informal construction sector accounts for up to 70% of all construction in Uganda. The annual average growth rate of the Uganda construction industry is 7.8%, according to the State of the Nation Address by H.E. the President of Uganda, Yoweri Kaguta Museveni, during the opening of the 4th session of the 6th Parliament of the Republic of Uganda, 2nd June 1999 at the Kampala International Conference Centre. There is need to study the safety aspect of this booming industry since it plays a significant role in national development.

Design aspects

Construction, like all activities requiring man's physical input, is a risky venture and therefore a good design should incorporate an allowance for the risk element. Harris and McCaffer (1995) state that the inherent uncertainty in the construction industry arises from the complex nature of the industry. Ransom (1987) argues that causes of failures/accidents in the construction industry are either due to faulty design, to poor execution, to the use of poor construction materials or through unexpected user requirements. He emphasises the need to bridge the gap between the designers and the constructors, and examine the designs for buildability.

Blake (1989) names three requirements for approval/certification of building plans with reference to England and Wales, namely, compliance with loading, ground movement and disproportionate collapse. The building should be so constructed that the combined dead, imposed and wind loads are sustained and transmitted to the ground safely, and without causing such deflection or deformation of any part of the building, or such movement of the ground as will impair the stability of any part of another building. The structure(s) must, in addition to the above considerations, satisfy the functional needs of the building, site factors and the many technical requirements concerned with the safety, health, comfort and convenience of the occupants.

The design codes for structural work of concrete and reinforced concrete design are BS 8110: 1985, Parts 1 and 2. A good design should involve weighing the risk to health and safety produced by a feature of the design against the cost of excluding that feature (in financial terms, fitness for purpose, aesthetics, buildability and environment impact). The duty of the designer is, however, limited to the risks which he/she can reasonably foresee at the design stage.

Safety and Health

In Uganda, the Factories Act Cap. 198 (1964) makes provision for the health, safety and welfare of persons employed in factories and to building operations and works of engineering construction undertaken by or on behalf of the Government (or the Common Services Authority). The parts that are specifically relevant to factories, premises and sites of building operations and works of engineering construction are Part IV (General Provisions for Health); Part V (General Provisions for Safety); and Part VI (General Provisions for Welfare).

Clauses 34 and 35 of the FIDIC Conditions of Contract for Works of Civil Engineering Construction (1987) state as follows: "Due precautions shall be taken by the contractor, at his own cost, for the safety of his labour and personnel. He must ensure that medical staff, first aid equipment and stores persons are available at the camps, housing and in the site at all times throughout the period of the contract." According to Henry (1996), all aspects of safety are of paramount importance in both design and construction and many of these are covered extensively in national regulations and codes.

Accidents

According to Blake (1989), building structures may be subjected to such hazards as impact from aircraft or vehicular traffic; internal or external explosion caused by gas, petrol vapour or sabotage; fire; settlement; coarse errors in design, detailing or construction; and special sensitivities to differential movement or conditions of elastic instability, not appreciated or allowed for in design. It is pertinent to recognize that hazards exist outside the range of conditions normally considered in design and must therefore be eliminated or the structure designed so that their consequence is acceptable.

Carasco (1993) carried out a study on conditions of work and their impact on the safety and health of workers. This study revealed that individual workers are very often prone to accidents associated with their work because of inadequate safety provisions. The major occupational health hazards were classified into the following:

- Physical hazards: lighting, extreme heat, ventilation, noise, intense physical activity, electric shock, dust, fire and vibration;
- Chemical hazards: exposure to diesel oil, lubricating oil, and carbon monoxide;

- Mechanical hazards: vehicle, abrasive/cutting tools, hand tools, cranes and lifting gears, and contact with hot parts of machines;
- Ergonomic hazards: repetitive work, poor work posture, long standing times, lifting heavy objects; and
- Psychological hazards: stress, excessive overtime, and lack of job control.

Some of these hazards are true for the construction industry in general. However, the accidents that have received wide publicity in the recent past have mainly been associated with inadequate shoring of excavations, and inadequate reinforcement of columns, beams and slabs (and formwork) in reinforced concrete structures. Safety in excavation has particularly received considerable attention because of recurrent fatalities in this work.

METHODOLOGY

Exploratory research involving descriptive methods was selected for the research study because it was envisaged to be the best approach for obtaining suitable responses to questions concerning the status of the subjects under study. Data was collected in order to answer the established research questions.

Study area

The research was conducted in five (5) districts namely; Kampala, Jinja, Mbale, Mbarara and Mpigi. Construction activity is widely spread in the country but is mainly concentrated in urban areas. The Statistical Survey for Uganda (1980), presents Kampala (central), Jinja (eastern), Masaka (central), Mbale (eastern), Mbarara (western) and Gulu (northern) as the principal towns in Uganda, and provided a basis for selection of the districts included in the study. Gulu was not considered for this study because of the insurgency that was prevailing in the northern region of Uganda, while Masaka was replaced by Mpigi (central) for the purpose of this research because, at district level, the latter has a bigger population than the former.

Case study

The accident at a site along Pilkington Road, opposite (National Insurance Corporation Building and) Uganda Electricity Board District Office, on 31st October, 1997 was chosen as a case study, because of the wide publicity given to it by the media and the great concern it raised among the public. In this accident, which involved the collapse of a foundation trench, four workers were killed and several others injured.

The authors visited the site shortly after the incident, together with two officers from the then Ministry of Lands, Housing and Physical Planning, and carried out a few on - spot observations. The authors later on held interviews with an officer in the Occupational Safety and Health Department and another in the Workmen's Compensation Section in the Ministry of Gender, Labour and Social Development. The authors also interviewed an official of the loss assessors appointed by the contractor's insurers to evaluate the damages arising from the incident, and a representative of the client. The findings are presented in the section entitled. Findings and Discussion – Findings from the Case Study.

Survey population

Subjects for the study came from a population of project managers, architects, engineers, planners, quantity surveyors, safety and health inspectors, labour officers, contractors, sub-contractors, craftsmen and casual labourers on one hand, and promoters/clients and opinion leaders on the other hand. Opinion leaders included representatives of journalists, lawyers, insurers and loss assessors as well as the police. Stratified random sampling was used to classify the population according to professional background.

Sample selection

Because of the big size of the population, which is at the same time scattered all over the country, a sample survey was adopted. A sample of 160 people engaged in construction (directly or indirectly) was randomly selected from both public and private construction projects in Kampala, Jinja, Mbale, Mbarara and Mpigi Districts, as outlined in the **Study Area** sub-section.

Data collection

The data collected was from primary and secondary sources. The primary sources consisted of administration of a questionnaire; observation of construction activities on various sites; and interviews with a few personnel based on an interview schedule.

The secondary sources consisted of publications, articles and other written documents available in libraries; relevant documents from government departments; the news media; and the Internet.

Data processing and analysis

Raw data collected was first sorted, edited, coded and then entered into a computer spreadsheet. The data was then analysed using Microsoft Excel (spreadsheet) and Microsoft Access (database) computer programs. The response rate for each item in the questionnaire and site observation schedule and the overall percentage of returns from the sample size were also determined. Appropriate graphical representations were obtained as well. The analysed data was finally presented using descriptive methods for easy interpretation and to enable comparisons and inferences to be drawn. This was supplemented with qualitative data obtained in form of verbal responses from interviews.

FINDINGS AND DISCUSSION

The findings presented in this section follow from the analysis of the data collected through personal discussions and interviews, questionnaires administered to the survey population, observations made on sites and information obtained through literature review and Internet surfing.

Table 1 below indicates the accidents recorded per industry between 1996 and 1998, while Table 2 below presents the reported fatal accidents in the same period. The construction industry is depicted in Table 1 to be the second most accident-prone industry (after the manufacturing industry). Table 2 indicates that the construction industry has registered more fatal cases in the past 3 (three) years than any other industry. *This information was extracted from the Workmen's Compensation Section (January 1996 to December 1998).*

Table 1: Distribution of Accidents per Industry

Industry	1996	1997	1998	Total	Average
Agriculture	2	1	4	7	3
Manufacturing	39	68	43	150	50
Electricity, gas and water	20	19	10	49	17
Construction	46	49	51	146	49
Transport and Communication	0	6	2	8	3
Government	8	1	1	10	4
Mining and Quarry	5	0	1	6	2
Commerce	6	5	7	18	6
Services	25	25	32	82	28
Total	151	174	151	476	

Table 2: Distribution of Fatal Cases per Industry

Industry	1996	1997	1998	Total	Average
Agriculture	0	0	0	0	0
Manufacturing	1	3	1	5	2
Electricity, gas and water	0	1	0	1	1
Construction	4	6	7	17	6
Transport and Communication	0	1	2	3	1
Government	0	2	0	2	1
Mining and Quarry	1	0	0	1	1
Commerce	0	2	1	3	1
Services	0	3	1	4	2
Total	6	18	12	36	

The characteristics of the registered injuries to workers in the period 1996 – 1998, as compiled in the Accident Register (Workmen’s Compensation Section), are summarized below. There is, however, scanty statistics for the accidents that have occurred in the construction industry in Uganda.

- Carelessness of machine operators and/or faulty machinery such as bull dozers, graders, rollers, compressors, hydraulic pumps, band saws, surface planers etc. [**knocks and cuts**].
- Lifting or dragging heavy objects such as timber planks, steel bars, water pipes, culverts, manhole covers etc. while loading onto/off-loading from a truck or delivering to/from storage or during installation [**bruises and cuts**].
- Workers falling from high levels of a construction, ranging from a slip off a ladder or scaffold to partial collapse of the construction, or workers falling into unprotected shallow excavations (e.g. manholes) or workers being hit by falling objects [**falls**].
- Workers being cut or pierced by sharp objects such as iron sheets, nails, glass etc. [**cuts**].
- Burns from gas flames during welding operations, boiling bitumen during road surface dressing operations, and chemical irritation from lime, cement, adhesives etc. [**burns**]; and electric shock [**shock**].

Findings from the case study

It was established that the excavation that collapsed was only 3 m away from the existing Colline House and the depth of the foundation trench was over 7.5 m deep. It was further established that the temporary support had been provided well before commencement of the torrential rains that prevailed during the period in which the accident occurred. No extra support had been provided when the rainy period began. It is believed that the soil adjacent to the excavation absorbed a lot of water because of the continuous heavy rains, weakened the grip of the soil and as a result a sizeable block of soil became loose. The timber shoring provided could no longer adequately support the pressure from the soaked soil. As a result the vertical timber supports and horizontal bracings were broken against the pressure of the soil, and the sides of the foundation trench collapsed.

There are a number of lessons to learn from the case study, namely:

- The Contractor should appoint a competent person to oversee all site operations and ensure that they are safely carried out.
- Supervisors (consultants) should have a competent representative on site (Clerk of Works) to advise the contractor on safety precautions and other technical matters.

- Occupational Safety and Health (OSH) Department should monitor site activities and advise the contractor(s) on appropriate safety provisions to make, including any improvements where required.
- Kampala City Council (and all local authorities) should monitor and control all developments.
- Professional institutions should ensure that members adequately fulfil their professional obligations.

Major findings

The questionnaire respondents rated the present and potential sources of accidents in the Ugandan construction industry as shown in Figure 1 below.

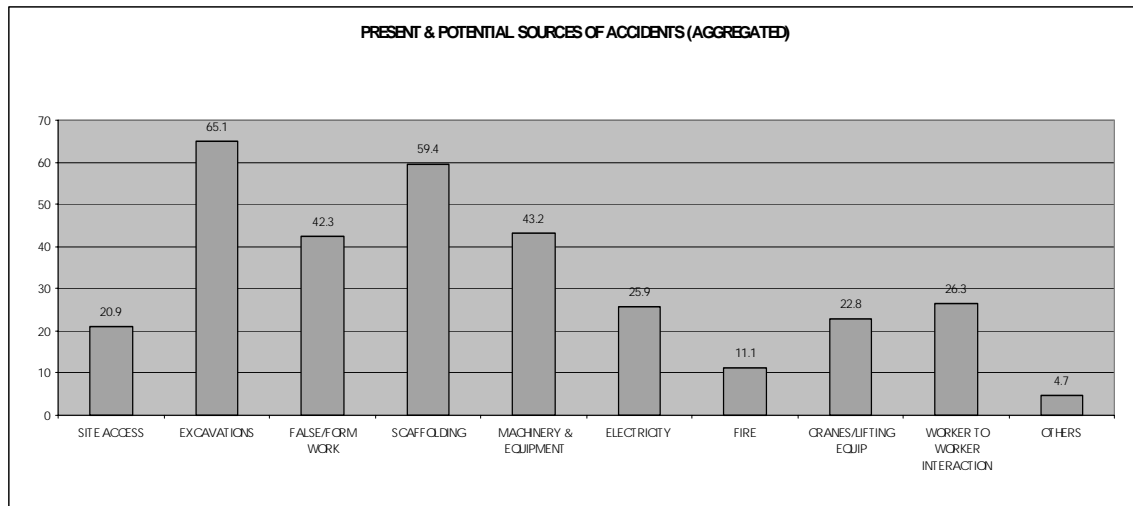


Figure 1: Potential Sources of Accidents

The figure shows that the rating of the sources of accidents is in the following order: - Excavations; scaffolding; machinery and equipment; falsework and formwork; worker to worker interaction; electricity; cranes and lifting appliances; site access; fire and other factors. The research also revealed that the cause of accidents in the construction industry is a multi-faceted phenomenon mainly attributed to inadequate supervision; use of incompetent personnel; use of inappropriate construction techniques; use of poor quality materials coupled with a lack of quality control to ensure compliance with standards or specifications; insufficient soil investigations; weak foundations; poor site layout; and other factors.

The authors argue that the blame for the **weakness in supervision** which this research has revealed as the main cause of accidents cannot be apportioned to the contractors alone since, in general, all stake holders have not satisfactorily played their roles. The general research findings are summarised in Table 3 below and presented according to the research questions to which they pertain.

Table 3: Summary of Research Findings

Variable	Description of Observation	Research Question Answered	Remarks
Adequacy of Designs	There is lack of appreciation for use of professionals. Most clients utilize private designers for their developments who in many cases do not offer value for money. Most of these do not have the requisite qualifications and those that do, lack professionalism or do not have sufficient expertise to work independently. Site investigations are hardly carried out before embarking on the design stage and quite often there is non-compliance with or evasion of design code requirements.	No. 1.	A majority of structures being constructed are based on unapproved designs, many of which are not adequate. This is a big factor contributing to occurrence of accidents.
Quality Materials	The enforcement of the recently established Ugandan Standards (Standard Specifications) for building materials is still a problem. Quality control is not carried out on 59% of the sites. Structures constructed out of poor quality materials are usually very weak and prone to accidents.	No. 2.	Poor quality materials contribute 13.5% of the accidents in the construction industry.
Construction Techniques	Inappropriate construction techniques are used on 35% of the sites, mainly in the batching, mixing, transporting, placing and compacting of concrete. Scaffolds have been another problem area mainly because of weak joints, inadequate anchoring at the base and loading the planks beyond their safe load. Use of inappropriate construction techniques usually results from using incompetent personnel, lacking relevant qualifications and experience.	No. 3.	Use of inappropriate construction methods/techniques contributes 14.2% of the accidents in the construction industry.
Supervision	Most supervising authorities have not been carrying out their duties to the required magnitude. A large number of designers do not follow up to supervise the works during the construction stage, either because of lack of commitment or lack of facilitation by the client. Most of the professionals are focused in Kampala and a few other districts, and therefore do not fully meet the clients' needs. The majority of projects are supervised by technicians and these form the bigger supervision force outside Kampala and in most rural areas, probably because of the economic situation prevailing in the country, which forces developers to search for cheap labour.	No. 4	Inadequate supervision has been identified as a major factor contributing to the occurrence of accidents on construction sites, and largely results from use of incompetent personnel or mere lack of commitment. Inadequate supervision and use of incompetent personnel together contribute 32% of the accidents in the construction industry in Uganda.
Safety on Site	There is weakness in enforcing safety and health regulations and lack of maintenance. There is also little regard for insurance, which most people take to be a waste of financial resources, and so do not realise the benefits that accrue from taking insurance covers. Safety is, on the whole, not given adequate consideration in the construction industry whereas there is at least one potential source of accidents on every site. There was no warning sign on 67%, and no protective wear whatsoever on 44% of the sites visited. There are indeed very few organisations/firms that adhere to safety and health regulations.	No. 5 and No. 6	There is lack of awareness of the safety and health regulations stipulated in The Factories Act Cap. 198 (1964) and subsidiary legislation, The Public Health Act Cap. 269 (1965), The Workers' Compensation Act (2000) and enforcement of these Acts is still a big problem.
Safety and Productivity	There is on the whole lack of motivation whereas there are quite often tight production targets. There are hardly any safety provisions on the majority of construction sites. On the other hand many workers do not use the personal protective equipment issued to them (where this is company policy) whereas it is for their own protection. This has a negative bearing on their productivity.	No. 9.	Safety on site and workers' welfare are fundamental to operational efficiency, and improved safety should enhance productivity.
Situation in Other Countries	In the European Community, 15% of all industrial accidents and 30% of all fatal accidents that take place in the Member States take place within the construction sector.	No. 8.	The construction industry is, arguably, one of the highest-risk industries globally.
Other factors	Negligence, carelessness/lack of commitment; hunger and fatigue; ignorance and lack of experience; poor communication and language barrier; inadequate visibility and inadequate lighting particularly for night shifts. 8% of the respondents stated worker to worker interaction among the problem areas.	No. 1	The human factor was found to play a significant part in the causation of accidents.

SAFETY PROGRAMME

The major outcome of this research is the **Safety Programme (Guideline)** in line with the 3rd research objective and as a response to the 7th research question. A safety program may be defined as an outline of the safety policies, practices, and procedures (Reimer (1999), and should provide actions that must be taken to regulate the factors that cause accidents, and systematically integrate them into the day-to-day management and operation of the company. A safety policy is a more detailed document containing the specific plans and procedures, and should include, but not limited to, the following:

- General safety policies – statements about management’s commitment to safety.
- Hazard assessment procedures - checklists for assessing hazards on a job site.
- Safe work practices and procedures - instructions on how to do specific jobs safely; ways of controlling hazards and doing jobs with minimum risk to people and property.
- Personal protective equipment (PPE) information - policy statements and instructions for use of personal protective equipment.
- Maintenance policies and information - policy statements regarding maintenance and care of equipment.
- Training policies - policy statements regarding training requirements e.g. new employee safety orientation, job-specific or specialised training, safety training for supervisors and managers etc.
- Inspection policies - forms for regular inspection of the job-site for unsafe conditions/acts; observations should be documented and corrections made.
- Incident investigation policies and information - policies and forms for determining the cause and prevention of re-occurrence of specific incidents.
- Emergency provisions - regulations regarding first aid, reporting forms; information to be used in emergency situations.

PPE should be used by all employees particularly in those conditions where safety hazards are envisaged and used, not as a substitute for, but as a supplement to administrative and engineering controls. The basic PPE should include hard hats (helmets), eye protection (safety glasses, goggles or face shields), safety footwear and appropriate clothing. Specialised PPE, such as respirators, fall protection equipment and special clothing, is recommended to be used for protection from specific hazards. Use of safety equipment should supplement the administrative and engineering controls and should, therefore, form a part of the safety program. Administrative control should also include clear definition and assignment of responsibilities (obligations/roles), as summarised in Table 4 below.

Table 4: Summary of Major Safety Obligations for Construction Site Personnel

Manager	Supervisor/Foreman	Worker
1. Establish and maintain a safety policy, and provide a safe workplace.	1. Comply with regulations, promote safety awareness, establish safe work procedures, incorporate safety instructions in routine orders and instruct workers appropriately.	1. Use safe work procedures and use the correct tools and equipment, including personal protective equipment (PPE).
2. Ensure compliance with regulations, proper training of workers and arrange induction courses for new employees.	2. Report and correct unsafe practices and conditions.	2. Report unsafe practices and conditions and report any injury.
3. Provide personal protective equipment (PPE), warning signs and ensure that regular inspection and maintenance of all plant and equipment are done.	3. Detect and discipline troublesome employees.	3. Make suggestions for improving safety standards.
4. Provide first aid facilities; correct unsafe conditions and attend promptly to all equipment defects.	4. Enforce safety rules, regularly inspect site for any hazards and investigate all accidents.	4. Comply with and observe rules, regulations, and follow instructions issued by supervisors for purposes of individual as well as collective safety.
5. Investigate and report all accidents	5. Assess condition of and	5. Set a good example to fellow

to O.S.H. Department and regularly maintain workers.
Workmen's Compensation equipment.
Section.

In general, there is need for improvement in the attitude to safety in the organisations and better management of the construction process to help prevent accidents and ill health. This calls for management commitment, leadership, and genuine, visible involvement. It is recommended that all organisations should develop a safety program, as outlined above, customised for their functions and services. The authors also call upon all stakeholders in the construction industry to play their various roles more devotedly.

CONCLUSIONS

The general conclusion is that accidents are caused by a wide range of factors, some of which are:

1. Lack of awareness of safety regulations;
2. Lack of enforcement of safety regulations;
3. Poor regard for safety by people involved in construction projects;
4. Engaging incompetent personnel;
5. Non-vibrant professionalism;
6. Mechanical failure of construction machinery/equipment;
7. Physical and emotional stress; and
8. Chemical impairment.

RECOMMENDATIONS

Based on the research findings and subsequent discussion, the authors recommend as follows:

1. Review existing safety regulations;
2. Enforce building and safety regulations;
3. Sensitise the professionals, and sensitise, educate and train the public;
4. Engage competent personnel and ensure close site supervision;
5. Promote professionalism and ensure compliance with the professional code of ethics;
6. Undertake insurance covers and consider health and safety at all stages of project implementation;
7. Maintain and regularly service tools, plant and equipment; and
8. Ensure good site organisation and good housekeeping, and provide sanitation, health and first aid facilities.
9. Further research should be carried out on the **Effects of Safety on the Productivity at Construction Sites.**

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