



*serviens in lumine veritatis*

*CHAPTER II*  
*LITERATURE*  
*REVIEW*

## **CHAPTER II**

### **LITERATURE REVIEW**

#### **2.1. Construction Industry**

The term “construction industry” implies the existence of a single uniform entity that is the builder of all the world’s projects. In reality, the construction industry is an umbrella concept that encompasses a broad array of specialized crafts, occupations, and professions. There are many construction specializations, such as general contractor, single family; general contractor, nonresidential; highway and street construction; bridge, tunnel and elevated highways; plumbing, heating and air conditioning; painting, paperhanging and decorating; masonry, stonework and tile setting; plastering, drywall and acoustical; carpeting and flooring; concrete work; structural steel erection; glass and glazing work; and wrecking & demolition. That is the abbreviated list of some of the more widely practiced fields that fit under the umbrella of the construction industry. Construction companies both large and small should be viewed and operated as businesses. Providing a safe and healthy workplace is one of the most effective strategies for holding down the cost of doing business.

The construction industry has changed markedly over the years, specialization is just one of the ways. All of the changes, whether positive or negative, that have occurred in the industry have had an effect on the safety of the construction job site. In fact, some developments have made certain aspects of

construction work safer, while also introducing new and even more dangerous hazards.

The Construction Industry in Indonesia and Uganda face 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 Indonesia and Uganda (Kiggindu, B M & Tindiwensi, D. Lubega, H (2000)).

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 Indonesia and 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 minimize re-occurrence was warranted.

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

Based on the data findings from 1966 until 1997 the Indonesian economic has grown by 7 – 8 % per year. The national income per capita in 1995 was US \$ 1,023. The construction sector added to this 5.9 %. The national labor force amounts 91.4 million persons with 4.7 million working in the construction industry. Indonesia has 41,705 Construction companies and 4,912 Building Consultant companies. Around 6 % are big companies, 9 % are medium companies and 85 % are small companies.

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, 2 nd June 1999 at the Kampala International Conference Center. There is need to study the safety aspect of this booming industry since it plays a significant role in national development.

## **2.2. Accidents**

An accident can be defined as an unplanned event. The terms undesirable, unexpected, and noncontrolled have also been used to describe such events (De reamer 1958, US National Safety Council 1985). An accident does not necessarily result in an injury. Accidents that result in damage to equipment and materials and especially those that result in injuries receive the greatest attention. All accidents, regardless of the nature of the damage or loss, should be of concern. Accidents that do not cause damage to materials or equipment or injury to personnel may foretell future accidents with less desirable results.

The use of the term accident presents some problems in the area of accident prevention. First of all, the term accident is commonly associated with events that are assumed to be out of the control of the persons involved. Consider the situation in which a small child spills a glass of milk at the supper table. The child's defense, "But, Daddy, it was an accident," is used to imply that blame or fault should not be placed on the child. Although some may argue that the only implication is that the act was not perpetrated on purpose, the inference may be made that no action is required to prevent future spills. Regardless of the way accidents are viewed, the healthiest approach to prevention is to focus on the causal factors (Suchman, 1961).

A second problem presented by the use of the term accident is the common assumption that an accident involved damage or injury. Many unplanned events take place from which no damage or injury results. Such events are not treated in the same way as occurrences of property damage or bodily injury.

Those so-called near misses, which may be more frequent than one realizes, can be very effective signals about specific areas that need safety improvement. From the standpoint of safety, it would be most prudent to document as many near misses as possible and to develop plans to reduce or eliminate the chance of reoccurrence. Near misses are inexpensive “wake-up calls,” warning of future accidents that may occur if the appropriate measures are not taken. The key to accident prevention may be in recognizing near misses when they occur and then taking prudent steps to make the work environment safe.

In other words, 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.

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 vapor 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:

1. Physical hazards: lighting, extreme heat, ventilation, noise, intense physical activity, electric shock, dust, fire and vibration;
2. Chemical hazards: exposure to diesel oil, lubricating oil, and carbon monoxide;
3. Mechanical hazards: vehicle, abrasive/cutting tools, hand tools, cranes and lifting gears, and contact with hot parts of machines;
4. Ergonomic hazards: repetitive work, poor work posture, long standing times, lifting heavy objects; and
5. 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.

However, in the recent past, fatal accidents have occurred due to the collapse of some structures at various sites in Uganda and Indonesia. 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

1. 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);
2. The collapse of a building at a car mart at the former Pulsations Club in Kabalagala trading center on 11<sup>th</sup> May 1999, killing one worker (The New Vision, Wednesday, May 12, 1999);
3. 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
4. The collapse of a suspended maxpan floor slab of a two-storied 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”).
5. Four workers at PT Wijaya Karya (Wika) lost their lives and nine others were injured after a concrete wall collapsed at the construction site of the Gading Mediterania Apartments in Kelapa Gading, North Jakarta. The collapse of a concrete wall setting off a domino effect that caused 11 walls to topple and fall on at least 11 laborers working between them (The Jakarta Post, Saturday, June 7, 2003);



- ✓6. Three construction workers died when a crane collapsed from the 12<sup>th</sup> floor at the Sudirman Central Business District (SCBD) Suites apartment in South Jakarta (The Jakarta Post, Tuesday, May 4, 2004);
7. Six construction workers died when they trapped between the third and second floor due to the collapsed of the columns in the second floor at the furniture showroom in Sunter Agung, North Jakarta (The Jakarta Post, Friday, May 28, 2004). ✓

### **2.3. 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 emphasizes the need to bridge the gap between the designers and the constructors, and examine the designs for build ability. ✓

✓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. In Indonesia, the design codes for structural work of concrete and reinforced concrete design is SK SNI T-15-1991-03 Ministry of Public Works. 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, build ability and environment impact). The duty of the designer is, however, limited to the risks, which he/she can reasonably foresee at the design stage.

#### **2.4. Safety and Health**

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.

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 labor 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. ✓

✓ In Indonesia, regulation from Ministry of Manpower and Transmigration No : Per.01/MEN/1980 is about occupational health and safety for building construction. The main intention of this law/regulation is to protect workers in a building construction. There is also Joint Decision between Ministry of Manpower and Ministry of Public Works No.Kep.174/Men/1986, No.104/Kpts/1986 about occupational health and safety in construction site. ✓