

**CLASSIFICATION OF FACTORS CONTRIBUTING TO HIGH PREVALENCE OF
OCCUPATIONAL ACCIDENTS AT SINO ZIMBABWE CEMENT COMPANY.**

BY

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APPROVAL FORM

The undersigned people certify in writing that they have read and recommend a dissertation entitled, *classification of factors contributing to high prevalence of occupational accidents at Sino Zimbabwe Cement Company* to Midlands State University by Rumbidzai C. Samukange in partial fulfillment of Bachelor of Science Honors Degree in Geography and Environmental Studies.

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DEDICATIONS

This dissertation is dedicated to my loving mother and brother who continuously gave me their unwavering support and were pillars of my strength during the time whenever I could not go on.

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ABSTRACT

The main objective of this study was to investigate the factors contributing to high prevalence of occupational accidents at Sino Zimbabwe Cement Company. Purposive sampling technique was engaged to select the key informants for interviews which included the Finance Manager, SHE officer, Industrial nurse and NSSA factories inspector. The researcher used stratified sampling technique to select 64 respondents for the questionnaires from the target population of 322 employees. The major findings were that accidents at Sino Zimbabwe Cement Company were being largely attributed by job related factors and accidents were mainly due to burns and road traffic accidents. . The causes of such accidents were attributed to lack of adequate training, poor standards procedures and unrealistic production targets. The research revealed that occupational accidents negatively impact cement manufacturing at SZCC due to high rate of lost time; increased absenteeism and frequent stoppage of production operations. The company has introduced strategies to reduce accidents such as Safety talks and monthly plant inspections to raise the awareness level of the accident causation factors among the employees. Measures put in place to reduce accidents which include hazard identification risk assessment, trainings and standard procedures are not effective for accidents and injuries continue to take place. The study recommended that employees at SZCC need to attend courses on Occupational, Safety and Health offered by organizations like NSSA so that they would be well versed in Safety, Health and Environment issues. This helps reduce the prevalence of occupational accidents in the organization.

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LIST OF ACRONYMS

ILO	International Labor Organization
ISO	International Standard Association
NSSA	National Social Security Authority
OHSAS	Occupational Health and Safety Analysis System
OSH	Occupational Safety and Health
PPE/C	Personal Protective Equipment/ Clothing
SZCC	Sino Zimbabwe Cement Company
SHE	Safety Health and environment

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Chapter 1: Introduction

1.1 Background to the study

Nkrumah (2013) defines an accident as an unplanned chain of events which has or could have caused injury or illness and or damage to people, assets, the environment or reputation. An occupational accident is defined as an occurrence arising out of or in the course of work and resulting in a fatal or non-fatal occupational injury (ILO Code of Practice, 1996). Which results in occupational accidents, occupational injury, disease, or death. Accidents mainly occur due to unsafe acts of workers and the unsafe conditions that are generated by workers (NSSA 2005). Causes of occupational accidents may be attributed either directly or indirectly to oversights, omissions, or process and equipment malfunctions (Petersen 1978).

Occupational accidents are one of the persistent challenges faced by cement companies. Recently in December 2014 an employee died and another three co-workers were wounded at the Shayona Cement manufacturing Plant in Kasungu (Global Cement News 2014). Cement production requires a lot labour and uses large scale and theoretically harmful manufacturing procedures (Gandhi 2012). The industry experiences accident rates that are high compared to other manufacturing industries (Cement Sustainability Initiative 2013). There are a number of hazards inherent to the cement production process. Some examples of the hazards are exposure to dust, hot surface burns and transportation injuries. Workers are exposed to different hazards, which may have tremendous harmful effect on their health. These hazards may result from physical, chemical or mechanical agents (El Sobky, 2008). Every year lots of minor, major or fatal accidents occur due to material handling. Hazards associated with material handling are more as compared to the other hazards. (Naman Agrawal and Jain 2014)

The cement industry is not nearly as advanced as some other heavy manufacturing industries in the implementation of occupational health and safety management systems (Cement Sustainability Initiative 2013). The health and safety performance of the cement industry as a whole is lagging behind that of other, more proactive, sectors of manufacturing industry. More attention should be paid to this area across the whole industry. The accident and injury rate in the cement industry is higher than other industries such as petroleum refining and is affecting the reputation of the cement industry as a whole (European Agency for Safety and Health at Work 2002).

The cement industry employees approximately eight hundred and fifty thousand workers worldwide (Marlowe et al 2002). In the past four years three hundred and eight nine fatalities were recorded out of three hundred hired workforces (Cement Sustainability Initiative 2013). Analysis of accidents by cause shows that 79% of all fatalities arise from 3 main causes which are traffic and mobile plant which constitutes 43%, falls from heights and items falling 21% and employees being caught in moving and starting equipment which constitutes 15%.

Investigations in regions pointed out much higher risk is in developing regions such as Asia, Africa and South America (Cement Sustainability Initiative 2013). A study among cement workers in Nigeria reported that there were no specific training programmes for safety education, protective measures or accident prevention for workers which leads to high accidents (Musa et al 2012). Worldwide accidents in cement industries are caused to slips, trips and falls, falling or moving objects and lifting, overload and exertion. These three causes account for 66% of the total accidents (ILO 1998).

Although occupational accidents and work-related diseases have been of interest for a long time, due to lack of proper recording and notification systems the official numbers of occupational accidents and work-related diseases are missing for many countries (Päivi Hämäläinen 2009). The magnitude of occupational injuries in Zimbabwe remains hugely under reported (Mbiba and Ndubiwa 2006). In Zimbabwe there is no information on the number of occupational accidents in cement industries.

1.2 Statement of the problem

Accidents at Sino Zimbabwe Cement Company have become a perennial problem and their intensity is now catastrophic as compared to the previous years. Lost time frequency rate at the organisation is approximately 3 which is three times above the NSSA requirement of 1. This is resulting in employee disabilities, severe damages to property and the injury of quite a number of employees. Thus, leading to increased costs of repairing the equipment and compensation costs for injured workers respectively. The operations at Sino Zimbabwe Cement Company present several dangers to the lives and health of employees particularly to those who work within the plant and at the quarry site. For instance in 2014 an accident occurred whereby a stacker collided with a reclaiming resulting in the dismantling of stacker. The accident resulted in the company incurring more than two thousand US dollars to repair the machine. The question behind now is that, the company is incurring all these expenses but however there is the safety, health and environment (SHE) department to monitor the

operations. Therefore, the research aims to classify factors contributing to the high prevalence of occupational accidents at the Sino Zimbabwe Cement Company.

1.3 Research Objectives

1.3.1 General objective

- To investigate the factors contributing to the high prevalence of occupational accidents at Sino Zimbabwe Cement Company

1.3.2 Specific Objectives

- To identify the occupational accidents associated with cement production.
- To establish the frequency of accident occurrence
- To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures.

1.4 Justification of the study

Studies that have been done previously on Sino Zimbabwe Cement Company were on the socio-economic impacts of cement production on Hozheri community and on overcoming environmental challenges in the cement manufacturing sector through cleaner production there was none addressing occupational accidents at the area. It is therefore important that a study of this nature be carried out to determine the causes of occupational accidents and evaluate the effectiveness of the current management systems in reducing occupational accidents with a view to making necessary recommendations to achieve work safety.

Ensuring healthy and safe working conditions for employees and contractors is a fundamental key to corporate social responsibility, and is one of the most important issues for the cement industry. The study seeks to classify the factors contributing to the high prevalence of occupational accidents at Sino Zimbabwe Cement Company. The study is significant for the cement industry is faced with unique safety and health problems that require special attention. It is hoped that the study will benefit the cement company and other stakeholders to realise the causes of accidents and come up with better strategies to control the problem.

This study is intended to help identify the causes of accidents and increase knowledge and knowhow on how accidents can be reduced. Sound knowledge of the hazards and risks help them to demonstrate a sense of commitment and adherence to the specific operational codes of practices thus ensuring a safe and health workplace. Which is essential for the employees for it will help to increase productivity through identifying the factors contributing to the prevalence of occupational accidents. Therefore for reduction of all occupational diseases, injuries/fatalities, corrective and preventive action should be taken.

The study will also seek to highlight problems or areas that need to be improved in order to increase effectiveness in the occupational safety and health on the working environment at SZCC in order to reduce the frequency of accidents and work related disorders at the organisation.

Work accidents and occupational diseases are said to have an enormous impact on the health of workers and considerable economic and social impacts (Mounia et al 2014). Thus NSSA is also expected to benefit from the study for every Occupational disease and injury has a major effect on economy due to loss of productive hour, manpower losses, compensation to the victim's .Therefore for reduction of all occupational diseases, injuries/fatalities, corrective and preventive action should be taken will help in the improvement of the safety regulations currently in use. It will also help highlight the need for educational awareness and formulation of regulations that companies need to adhere to and reduce safety risks. Ministry of labour will also benefit from the study for the findings would assist in developing appropriate guidelines for manufacturing safety practise for people engaged in the industry in order to minimise accidents.

Other cement companies will also benefit from the findings as they are more or less exposed to the same safety and health risks at Sino Zimbabwe Cement Company. The study also want to add new information to the body of knowledge in related studies and will also provide reference material for other students and academic researching in a similar or related field because it will be placed in the Midlands State University library.

1.5 Study area

Sino-Zimbabwe Cement Company is a medium sized cement plant found in Vungu rural District. It is situated in Lalapanzi, at the Indiva farm about 42 kilometres to the east of Gweru City, the provincial capital of Midlands (Figure 1.1). It lies within latitude 30°3`E and longitude 19°25`S. The company is located at an altitude of 1280m above sea level (Kusena etal 2014). The cement plant is supported by the Quarry mine which is located at Hashu farm which is about 7km from the cement plant. The plant is easily accessible from all parts of the country through a good rail and road network. The plant commenced operations in October 2001.

Sino-Zimbabwe Cement Company has a total number of nine departments and total number of 373 employees (2014 Human Resources compliment Report). The study is going to be confined to five departments namely production, engineering, laboratory, quarry and procurement and supplies respectively. These departments are assumed to provide relevant information because the employees work in the plant where most major hazards of interests are likely to be found.

Sino-Zimbabwe Cement Company is located in agro ecological region three (Kusena etal 2014) .The average annual precipitation received is about 703mm (Prolixpack Consultancy 2014). The area has a continental-and-plateau/ continental-and-subtropical climate and records an annual average maximum temperatures range from 22 degrees in winter to 29 degrees in summer (Prolixpack Consultancy 2014). The soils found at both the quarry and the plant area belongs to the kaolinitic group which denotes strongly red soils with abundant clay fractions (Prolixpack Consultancy 2014). The most dominant type of vegetation found near the plant site is the julberna diaglobiflora. There are also other tree species such as dichrostachyscinerea, acacia karoo, ziziphusmucronata and PiliostigmaThonningii found in the area.

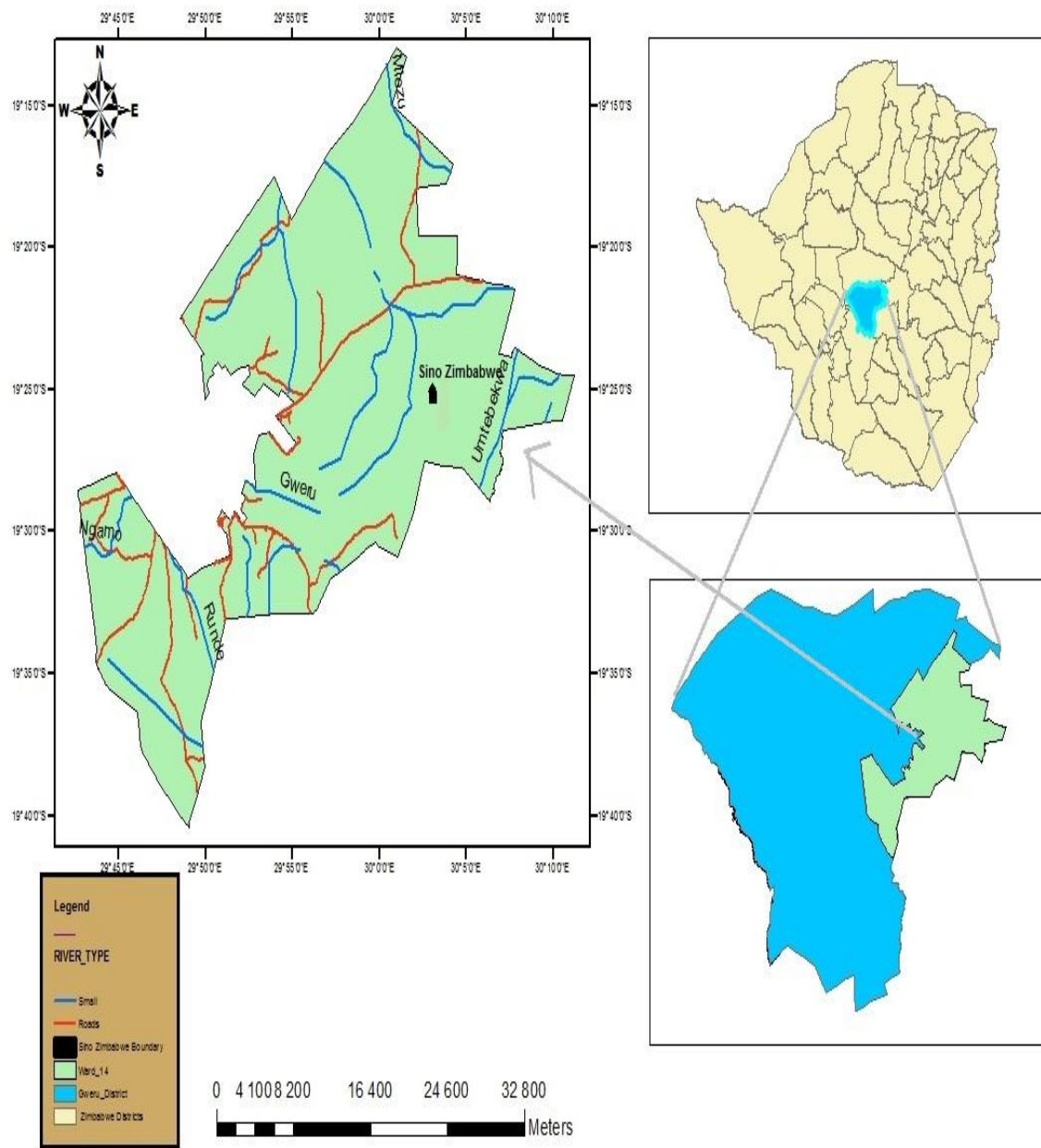


Figure 1.1: Location of Sino Zimbabwe Cement Company.

CHAPTER 2: LITERATURE REVIEW

2.1 General overview of occupational accidents in cement industries

According to Mutetwa (2005) an accident occupational accidents are an undesired event that results in physical harm to a person or damage to property. Sources of accidents vary according with the type of the industry. Accidents are caused by two main factors which are unsafe acts and unsafe conditions. Occupational accidents in cement manufacturing is a major cause of concern for they are more accidents being experienced than in other industries.

Most of the accidents which occur in the cement industries occur during equipment repairs in the production area as the production is labeled a high risk area. Injuries associated with cement industries are burns, bruises, cuts and abrasions. The frequently injured body parts of cement workers are arms, legs, hands, eyes and the back (Bachofen and Prodan 2011). Studies shows that the major causes of these injuries were welding, bucket elevators and belt conveyors (Naman etal 2014). Workers who are more susceptible to accidents are plant workers, general workers and drivers. Age groups between 20- 40 are greatly affected by occupational accidents in the industry (Ei-Megeedetal 1998).

Cement industries are categorized as one of the most unsafe industries to work in. The probability of cement quarry workers to be killed at the workplace is very high because of the hassles associated with their work. Workers in the industry are susceptible to harmful tools and machinery that threaten the lives of workers on a day to day basis. However, even though cement industries have adopted SHE issues the frequency of accidents is still very high.

2.2 Major Occupational accidents associated with the cement production.

2.2.1 Traffic accidents

Prevalence in the driving related events is the main cause of the high death tolls in the Cement manufacturing companies (Cement Sustainability Initiative 2012). Over 200 Cement sustainable initiative workers, contractors and third parties died due to road traffic accidents between 2007 and 2008. Truck drivers in the cement industry have a high pressured job which has inherent jeopardies. Drivers can be severely injured if they are involved in any accident associated to truck operations. Traffic accidents in cement companies mainly occur during haulage of raw materials to the cement plant (Bachofen and Prodan 2011). Road Traffic Accidents are mainly attributed to slippery roads and human error and results in

trucks rolling over and being completely damaged. Fatalities due to road traffic accidents in the cement industry can occur both offsite and onsite. Every year there are some 150 accidents in quarries which are reported to HSE. Many accidents in cement companies are associated with the use of vehicles.

2.2.2 Slips, Trips and Falls

Slips, trips and falls have been reported to be the major contributor of occupational accidents in the UK cement manufacturing industry (Mineral Products Association Cements 2015). Slips, trips and falls are usually triggered by inappropriate footwear, poor lighting system, poor housekeeping, trailing cables and pipe work especially during unblocking, maintenance and cleaning activities. They can also be attributed to the roughness of the surfaces in quarries and roads. Slips, trips and falls cause almost 30% of all injuries in Cement companies (Cement Sustainability Initiative 2012).

2.2.3 Burns

Cement employees are exposed to high temperatures when working in areas such as the kiln. Injuries such as chemical burns are experienced due to contact with hot cement powder. Studies in the Egyptian cement industry showed that the rate of lost time due to burns was 4776 days (EI-Megeed et al 1998). Therefore there is need to ensure effective controls are put in place. According to European cement research academy (2013) burns are usually experienced during plant maintenance when clearing blockages. If the hot cement powder get in contact with combustible materials it results in fires. Special attention therefore has to be directed towards working safely in these areas.

2.3 Causes of occupational accidents in cement production

According to Naman et al (2014) over buoyancy in experienced workers in cement industries is one of the major causes of accidents. Over confidence in workers is caused by experience and prestige by the worker that he has done the work for a long period and never got injured. Over confidence in employees at a workplace has negative effects on production. Once employees are overconfident they tend to ignore safety work procedures which causes workers to expose themselves and other workers working in their vicinities to risks (Carabelli 2014). Over confidence is one of the leading causes of accidents industries for it attracts workers to be involved in unsafe acts such as not following standard procedures when conducting their duties.

Lack of adequate training for inexperienced workers is one of the key factors leading to accidents in the cement manufacturing companies according to (Naman 2014). Production levels in cement industries are lowered by inexperienced worker`s lack of confidence to carry out their responsibilities at the workplace. OSHAS (2014) indicated unskilled employees are prone to injuries and accident causations. Most of the accidents experienced in industries are attributed to lack of adequate training of employees which is caused by lack of knowledge required by workers to safely operate equipment. Inexperienced workers also causes fatalities at the work place due to lack of adequate knowledge and trainings (Amo 2014).

The absence of operative risk management programmes in cement companies is the reason why fires, explosions and structural collapse are being experienced in the industry due to lack of appraisal of safety issues (Cholamandalam MS Risk Services Limited 2009). Risks assessment is not prioritized in cement accidents and regularly safety issues are not reviewed. Studies by the Cholamandalam risk services (2009) shows risks that in cement industries are not being recognized, evaluated and managed in the correct manner. Safety assessments done does not uncover all risks associated with cement manufacturing. Ineffective risk assessments in cement companies are a major cause of the high prevalence of accidents in the industry.

The cement industry is characterised by a lot of hazardous areas which poses a lot of risks to the workers (Syed etal 2014). Hot areas and preheaters expose workers to high temperatures which results in the workers being experiencing severe burns. Areas of the quarry where there are particular health or safety hazards need to be marked and treated as danger areas. All people, other than those who have been specifically authorised to enter for essential purposes and who have been trained in the necessary safeguards, must be excluded from such areas, for example by erecting warning signs and barriers. The barriers should clearly identify the boundary of the danger area and make entry impossible without a conscious effort.

Immense pressure imposed on cement employees increases the rate of injuries for they frequently work under severe pressure in order to attain their jobs (Cement Sustainability Initiative 2012). The injuries due to fatigued workers has intensified the risk of accidents (Holcium 2010). Particularly cement truck drivers are faced with the challenge of being given short periods of time to deliver cement for cement hardens if it remains exposed to certain conditions like during the rainy season. The trucks have a high center of gravity, and are more likely to rollover than other vehicles, with the added danger of cement spilling over the

road or highway. The pressure to deliver as well as traffic conditions in the cement industries can contribute to a serious accident.

2.4 Theories of Accident Causation

2.4.1 Domino Theory

The theory was developed by Herbert William Heinrich in 1931(American Psychological Association 2008). There are five aspects associated with the domino sequence which are the working environment, human causes, substandard practices and substandard conditions (defective tools, horseplay and inadequate procedures), accident and injury. Heinrich defined an accident as a single aspect of the five influences of accidents which in the manner dominoes would be arranged which leads to an injury. Heinrich argued that each and every aspect trigger the subsequent phase in the sequence (Feyer 2009). Domino theory is a reaction involving the potential of multiple events at each stage, with each established causal factor capable of continuing the reaction itself and of interacting with other factors. Ball 2006 says heinrich emphasized that accidents do not just happen but they are caused by workers and the organization is liable for alleviating the occurrence of accidents. He argued that the elimination of a single aspect in the sequence would prevent an accident.

2.4.2 Multi Causation Theory

The theory was anticipated by Peterson in 1971. He proposed that a couple number of indiscriminate factors are the bases an accident and different combinations of the factors causes accidents (Abdelhamid and Everett2000). He believed that by investigating accident causations a lot of factors leading to the occurrence of an accident would be acknowledged. According to his theory accidents can be classified into two classes which are personal and job related factors. Peterson argued that the unsafe acts or conditions could be the contiguous effect of the accident but not the root cause. He also argued that root causes of accidents must be identified in order to prevent accident occurrences.

2.5 General effects of occupational accidents in the cement industry

Cement industries are losing a lot of money due to occupational accidents (Tomar 2014). Organizations are incurring costs to repair damaged machinery, buildings and vehicles which are damaged by occupational accidents such as explosions, road traffic accidents and collapsing structures. Also cement companies are losing large amounts of money in

compensations and legal expenses specifically if they are found to be have not provided employees with suitable safety and measures.

Loss of lives in cement industries is very high (Cement Sustainability Initiative 2012). Deaths in cement industries are mainly due to electrocutions, structure collapses, explosions and burns (Global Cement News 2014). Studies shows that road traffic accidents constitute to most of the deaths which occurs in cement companies. Contractor workers have the highest death tolls in cement industries. In 2014 the largest number of people who died in in a single organization was seven. These employees were reported dead after cement factory collapsed in Mongla, about 188 miles southwest of the capital, Dhaka due to sub-standard safety conditions at factories (Global Cement News 2014)

Accidents affect productivity in cement industries especially due to loss of specialized skilled works and property damages. Productivity suffered greatly due to loss of specialized skilled workers who know how to operate certain types of machinery in cement industries for the machines used in the industries are very multifaceted and one has to be adequately trained inorder for one to operate them(Salma 2010). Machinery damaged causes production to stops for the processed in the production of cement are interlinked. Huge amounts of time during accidents. Health Safety Executive (2014) statistics shows that twenty seven million days are lost in construction industries in per year. Lost time hugely affects production in cement companies

Accidents causes suffering and pain among cement workers as the intensity of accidents are severe such as third degree burns experienced by mainly by workers who work in the kilns and preheater sections. Workers in the cement companies who work in cement quarries suffer from physical injuries occur as a result of energy impact of a sufficient magnitude to alter or disrupt the function and/or structure of tissue (Ezeonu 2004)

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Research Design

De Vaus (2006) defines research design as the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring one will effectively address the research problem. This study used a descriptive survey design collaborating both quantitative and qualitative paradigms. Chiromo (2006) says descriptive survey provide in-depth information and intimate details about a particular case. The researcher used both qualitative and quantitative methods which will be supplementing each other in order to come up with a comprehensive research. Quantitative and qualitative research methods enabled the researcher to use a variety of instruments such as documentary reviews, interviews and questionnaires.

The researcher employed qualitative research design on this study for it permitted the researcher to gather more information on the phenomenon under study from the targeted population like general workers. Furthermore, another reason for using a qualitative research design was that some of the variables of interest in the research such as behaviour and causes of accidents could not be measured using quantitative research design.

Quantitative research design was used specifically for numerical data collection, for example when collecting data on the average number of absenteeism due to occupational accidents. Quantitative research design is of great significance since trends and rates can be gathered to present data which can be analyzed diagrammatically. Using this design, tables and graphs were used to indicate average occurrence of occupational accidents at Sino Zimbabwe Cement Company.

3.2 Target population

Best and Kahn (1993) referred to target population as any group of individuals that have one or more characteristics that are of interest to the researcher. The researcher targeted workers from the five selected departments, SHE Officer, the industrial nurse, finance manager, and lastly the factories inspector from NSSA. These people were targeted because they provide relevant information as far as the research is concerned.

General workers and plant attendants were targeted due to their in-depth knowledge of what transpires in their respective sections and the hazards associated with their jobs. They are responsible for all the various processes and activities involved in cement production. They

are aware of the various occupational hazards that are associated with cement production throughout the entire stages of cement manufacturing activities. These were selected because they directly understand most of the causes and types of occupational accidents they encounter at work.

The industrial nurse was also targeted since he keeps all the records of the accidents which occur in the plant, their severity and their implications to the workers' health and safety. The industrial nurse is accountable for keeping records concerning occupational accidents and diseases. He also keeps all clinical records and ensures that people have their medical examinations when they are recruited into the company.

Factories inspector from NSSA Official was listed among the targeted people because he monitors the company's compliance to Occupational safety and health principles and regulations as per expected by the Factories and Works inspectorate. He also carries out workplace assessments and health surveillance. The factories inspector guarantees that the company operates within stipulated OSH parameters. He keeps records of all recorded occupational accidents and diseases and quarterly and annual OSH reports.

The SHE officer was also targeted since he is responsible for formulating OSH procedures, policies and keeps all records pertaining to occupational safety and health issues for the company. He also monitors the work area for unsafe acts and conditions, and bring issues to the attention of the foreman so that corrective action can be taken. He encourages co-workers to receive training in areas in which they are not proficient. The SHE officer is also responsible for conducting accident investigations and take corrective actions to preclude further occurrences.

The finance manager was also targeted as one of the key informants for he is the one who is responsible for taking into account what expenses concurred due to accidents be it Lost Time injuries and property damages. He also has records of how frequent accidents happen especially those which include property damages.

3.3 Sample size and sampling methods

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole (Webster, 1985). (Gay 1987) says that to produce reliable and best results for large population, the researcher has to use 20% of the targeted population. This translates to a sample size of 64 employees from the 322. The researcher used stratified sampling technique to select the respondents of the questionnaire from the target population of 322 employees. In order to determine the 64 workers the researcher calculated 20% of total population of each department and came up with 26; 12; 5; 10; 11 people respectively as illustrated in Table 3.1. Stratification was based on departments. The strata comprised of Production with 129 employees, Engineering 63, laboratory 25, quarry 49 and Procurement and Supplies 56.

Purposive sampling technique was also employed in choosing key informants like the SHE officer, financial manager, production manager, industrial nurse and NSSA official for interviewing. These people were selected since they are the most relevant and knowledgeable people in the issues pertaining to occupational hazards and accidents associated with cement manufacturing at Sino Zimbabwe Cement Company. The key informants were also purposively selected because the researcher knew that they possess relevant and reliable information needed for the success of the research.

Table 3.1: Illustration of sample size determination.

Department	NUMBER OF EMPLOYEES	SAMPLE SIZE
Production	129	26
Engineering	63	12
Quarry	49	10
Procurement and supplies	56	11
Laboratory	25	5
Total	322	64

3.4 Research instruments

3.4.1 The questionnaire

Clough and Nutbrown (2008) indicated that a questionnaire is a compilation of questions systematically drafted to obtain the views of individuals pertaining to a subject under investigation. This instrument was used because it is a fast and efficient way to obtain information. Workers from selected sections were targeted as respondents to the questionnaires. For this study, the questionnaire comprised of closed and open-ended questions to allow respondents to select their own answer from a number of options as well as expressing their wider views. The researcher designed one questionnaire and reproduced up to 64 questionnaires. The questionnaire comprised of section A, B and C. Section A of the questionnaire acquired respondent's personal information. Section B of the questionnaire acquired data pertaining to the types and causes of occupational accidents encountered at Sino Zimbabwe Cement Company, frequency of accident occurrence and the impact of occupational accidents on cement production at Sino Zimbabwe Cement Company.

Section C of the questionnaire encompassed factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures. The key issues for the questionnaire were built from the specific objectives of the study to ensure good results. The researcher self-administered questionnaires so as to enhance the return rate and clarify questions which were written in English which was not the local language in use.

3.4.2 Interviews

Semi-structured interview questions were used to gather data of the study from key informants. This enabled the representatives from various organizations to express their opinion on the occurrence of occupational accidents and how best they could be controlled. The interviews were conducted face to face with the interviewee and during the interview, notes were taken and tape recording was done especially on most critical issues in order to capture everything which was being said by the responded. The researcher set the questions to guide the interview and all key informants were notified and booked in advance to ensure convenience. The important issues included were developed from the research's specific objectives. The researcher targeted the factories inspector from NSSA, Safety Health and Environmental Officer, the industrial nurse, the Production Manager and the Finance Manager to obtain the required information as described in Table3.2.

Table 3.2: Key informants interviewed and justification of their selection.

Personnel interviewed	Justification
SHE officer	Governs and enforces all companies OSH procedures and keep all the companies OSH records. Have records of all occupational accidents that occur in the production field
Nurse in charge	Has information on the prevalence of occupational accidents
NSSA factory inspector	Has information on the total annual accidents and the most accident prone areas at Sino Zimbabwe cement company. Carries out workplace assessments and health surveillance Take part in planning and development process of occupational health and safety issues.
Finance Manager	To establish the cost of accidents at Sino Zimbabwe cement company

3.4.3 Field Observations

Field observations are precise records of what people do and say in real-life situations (Fraenkel and Wallen 1996). A field observation was done with the aim of gaining a close and intimate familiarity with the workers. An observation checklist guide was used to gather information collected using other data techniques in particular examining the causes of accident at Sino Zimbabwe Cement Company. A couple of general workers were observed while executing their duties and work practices during normal work operations. All the departments and their sections were catered for in the observation checklist. These were used to evaluate the way workers use the given PPE, respond to Safety and Health measures as a way to lessen occupational accidents at their workplaces. The researcher was also concerned with the workplaces which were deemed to pose hazards to the safety and health of workers.

3.5 Secondary data sources

Organizational records were used to supplement data collected from interviews and direct Observations. Records used include the clinic injuries on duty registers, medical reports, accident investigation reports, induction and training reports, internal and external audit reports and the company's safety and health plans. Statistical data was obtained from the SHE monthly reports were also analysed in order to view the causes of accidents in the organisation. The researcher obtained some literature containing statistics and trends on accidents, injuries, illness, and deaths in different industrial sectors were acquired from NSSA.

3.6 Data analysis and presentation

Data collected was interpreted using statistical and descriptive techniques. Robson (2002) defines data analysis as a process of inspecting, transforming, cleaning and modelling data with the goal of highlighting useful information. The data which was collected using the questionnaire was analysed and interpreted using a Statistical Package for Social Science (SPSS). Data was then categorized, tabulated and recombined to answer the initial research question. The data from interviews and observations were presented through descriptions and in some instances photographs acquired during direct observations. This data was diagrammatically represented in the form of tables, pie charts and bar graphs since they are easy to refer and they facilitate easy interpretation.

3.7 Ethical considerations

Approval was sought from Sino Zimbabwe Cement Company through the institution by way of a formal letter written to the key respondents by the Department of Geography and Environmental Studies Chairperson. Respondents were informed about the purpose and benefits of participating in this study and informed consent was sought .Each respondent was guaranteed that their responses would be kept private and data collected will be used for the purpose of the study only. Respondents were informed that their participation was voluntary and they were not going to be paid for participating in the study.

CHAPTER 4: RESULTS AND DISCUSSION

4.1 Background Information of Workers

Questionnaire responses indicates that 87.5% of the respondents are males whilst 12.5% are females. The findings illustrates that males are dominating in the labour force of SZCC and this can be attributed to the intensive labour requirements of the manufacturing industry as most of the activities are done manually and require too much man power.

From the 64 respondents most of the questionnaire respondents belonged to the age category of 18-40 years and just a few belonged to the category 41 to 50+ years. This indicates that SZCC is dominated by an economically active population.

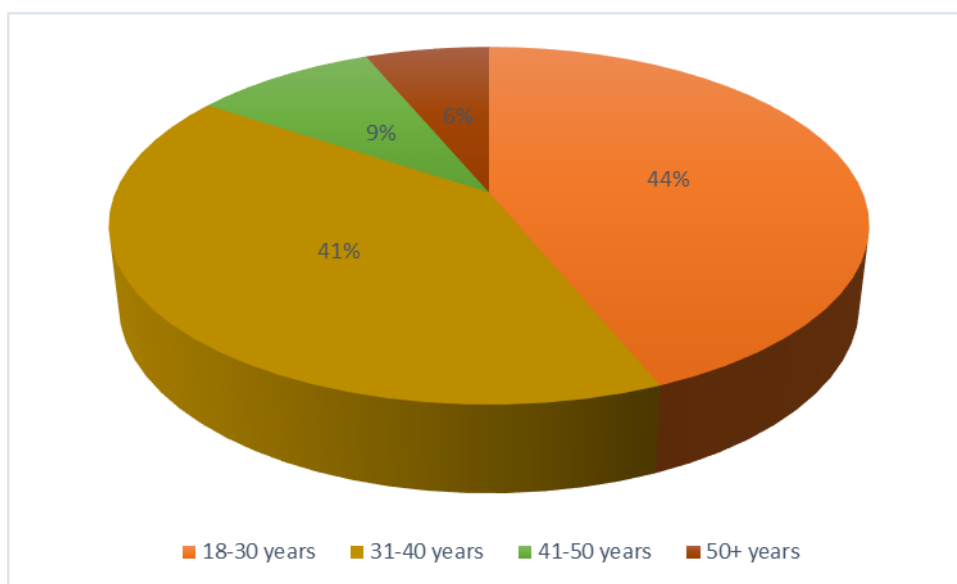


Fig 4.1: Age groups of respondents.

72% of the workers had attained tertiary and 22 % had attained secondary level as illustrated in fig 4.2. Only 2% of the respondents had attained primary level. The main reason why the company is dominated by educated employees is that the company retrenched unskilled workers in 2013 because of automated machines which were installed after refurbishment which required more skilled workers in the production sector. Hence only a few less educated employees are engaged into the company that is in the production and engineering section.

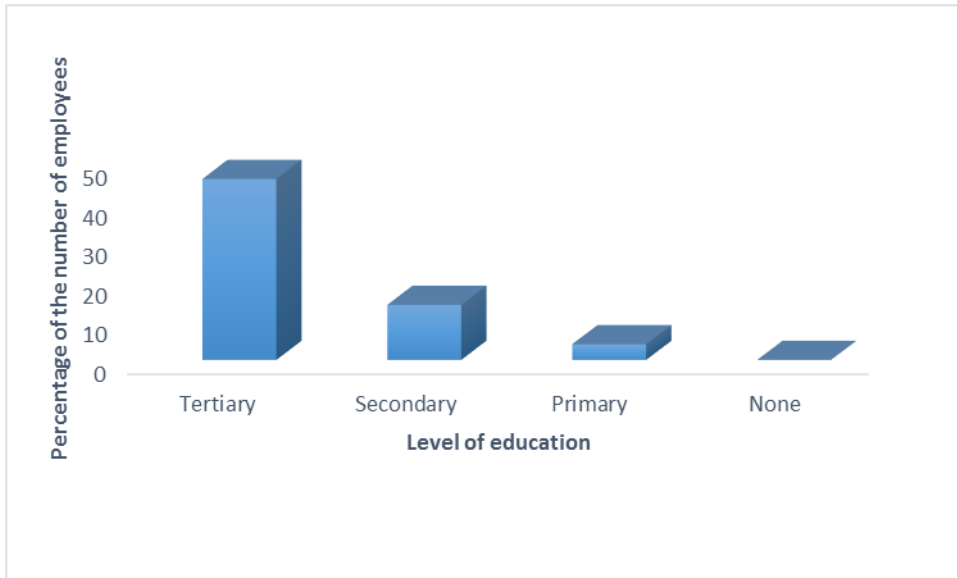


Fig 4.2 Respondent’s level of education

51.6 % of the respondents had been in the company for less than 5 years. Hence low experience and the most experienced workers are highly outnumbered by those with between 0-5 years employed at SZCC. The SHE officer emphasized that the reason for high number of new employees in the company is attributed to the retrenchment of 2013.

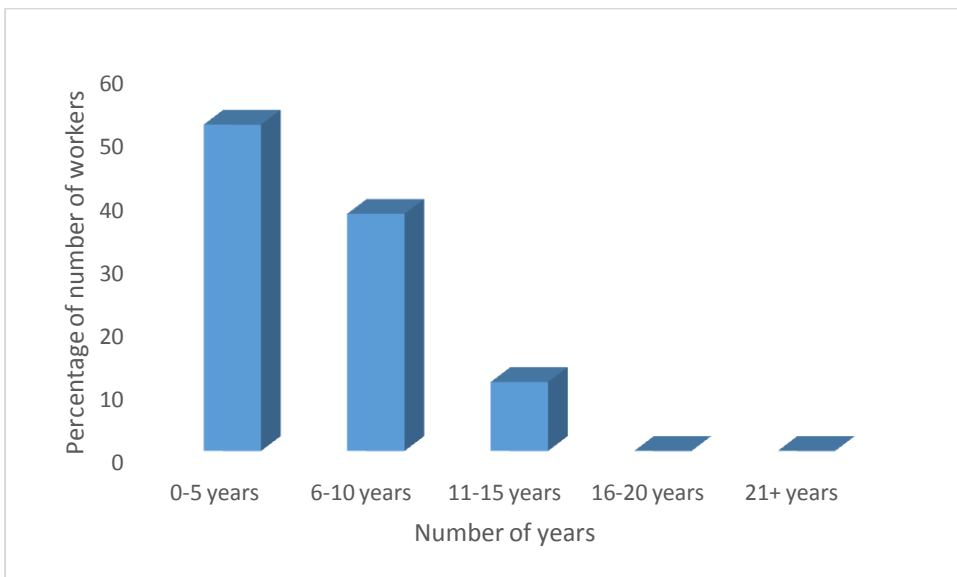


Fig 4.3: Employees’ working experience at Sino Zimbabwe Cement Company

4.2 Nature of accidents at SZCC

Cement production is dangerous in nature and occupational accidents varies at departmental level according to the nature of work the workers is exposed to. Miners, plant and engineering personnel were more susceptible to accidents. The production section had more accidents as compared to other departments. Prominent accidents experienced at SZCC consist of lacerations, burns, slips, trips, falls, being struck by falling objects, arch eye, explosions of gases. These injuries has led to the increase of absenteeism of personnel from work due to hospitalisation and work restrictions. Pain and suffering is also incurred by the worker depending on the extent of the accident. Accidents affect the injured person financially if he/ she was the bread winner of the family. The finance manager noted that most of the injuries are compensated by the workmen compensation from NSSA. However, if the fault is found to be the employers` the company has to pay the employee and more fine is paid. The company has lost approximately thirty thousand US dollars since 2012 due to workmen compensations. Accidents have a negative impact on production levels. For time a lot of time is lost during accident tourism as noted by the NSSA inspector that when the accident occurs everyone stops what they are doing to go and help the injured person and usually it takes up to thirty minutes before everyone is back at their work stations and when they get back they won` t work at the same rate as before since they would have been affected greatly by the accident and it usually takes weeks for people to get back to their usual working spirit

4.2.1 Falls

31% of the respondents highlighted that the major accidents experienced at SZCC are due to falls. Each and every department in the organization are experiencing falls. Slips are the major contributor of the falls in the organization for there are excessive oil spillages in most parts of the plant which makes the ground more slippery. Clinker pebbles and poor housekeeping are also contributors of falls at SZCC according to the accident investigations. Also the fact that there are a lot of tripping hazards particularly in the offices and poor lightning shows that falls are inevitable. These falls being experienced result in the dislocation of arms, excessive pains in the joints and backaches in workers according to records in the accident register at SZCC.

4.2.2 Road traffic accidents (RTA)

7% of the respondents indicated that RTAs are also being experienced at the organization. These accidents are mainly experienced by dump truck drivers and pull car drivers at SZCC. Information obtained from SHE accidents investigation showed that RTA`s were mainly experienced in the rainy season. This could be due to the slippery roads from the quarry to the plant. Road traffic accidents are being experienced both on site and off site. Dump truck accidents usually result in tipper trucks falling off as illustrated in plate 4.1, overturning or colliding with each other due to the excessive speed, slippery roads and unstable grounds in the quarry section during haulage alluded the SHE officer. These RTA`s are causing the company to incur a lot of expenses according to the Finance manager. Records shows that approximately 3 road traffic accidents are being experienced at the organization per month.



Plate 4.1 Hauling truck fell off on operator’s side at Pit 2 Waste dump.

4.2.3 Being struck by falling object

Workers particularly in the quarry and sales and procurement department are being at high risks of being struck by falling objects. 7% of the questionnaire respondents showed that

being struck by falling objects was one of the major contributors of injuries such as fractures. Falling objects in the organization are due to the limited space of storage goods tend to fall off during stocking. Rock falls are striking people during hauling. Workers suffer from concussions, blackouts and sustain injuries after being struck by falling objects.

4.2.4 Explosions of gas bottles

4% of the respondents highlighted that gas explosions which is one of the major contributors of industrial fatalities is also being experienced at SZCC. These explosions are being caused by the loose connections on cylinder hose which causes fire ignitions. The gas bottles constitute approximately 70% of fires in the organization according to the SHE records. However, though cylinder gas explosions are being experienced at SZCC none of the workers has been injured or burned by these fires. These fires have led to property damages. Boiler makers in the engineering and production section are at risk of experiencing these explosions. Though no one has been injured by the explosions these minor explosions can be a ticking time bomb if they are not addressed to.

4.2.5 Severe burns

27% of the questionnaire responses revealed severe burns are one of the major accidents occurring at SZCC. Burns affect workers from the production department throughout the year particularly those who work in the kiln and preheaters section. These workers are exposed to high temperatures of about 1500 degrees Celsius. Blow backs of preheaters during maintenance or plant inspections result in workers suffering from third degree burns and eye splashes expressed the Industrial nurse. The fact that some of the machines in the kiln and preheaters can only be repaired whilst they are running shows that the workers are bound to suffer from burns. The industrial nurse alluded that the highest number of lost time in the organization are due to burns. Reports at the organization show that approximately \$8 500 was lost this year due to burns.

4.2.6 Skin lacerations / Cuts

22% of the respondents revealed that they experience cuts or lacerations in their organization. Major cuts or lacerations are experienced on the fingers on the hand. These injuries are mainly high in the engineering and laboratory department due to the equipment they use which is very delicate and complex. Major findings from the accident reports show that lacerations in the engineering departments are due to the fact that workers will not be wearing

appropriate personal protective equipment. Most of the lacerations results in the workers being stitched at the clinic since they will be deep cuts from either machinery such wood saws. Lacerations and cuts causes the workers to be restricted from work for a certain period depending on the nature of cut.

4.2.7 Arch eye

Cement manufacturing at SZCC is characterized by a lot of welding during maintenance of equipment and assembling of equipment due to the fact that a lot of equipment used are not locally manufactured alluded the finance manager. The respondents indicated that arch eye constituted 6% of the accidents experienced at the organization. Workers are exposed to welding sparks for long periods of time trying to meet their targets. Workers from the engineering production and quarry section particularly boiler makers suffer from arch eyes.

4.2.8 Electrical shocks

3% of the workers highlighted that there were electrical shocks being experienced particularly in the production and engineering sections. Machinery used at SZCC uses high voltages of electricity which is bound to cause electrical shocks or even electrocution if one is not alert. Electrical shocks were being experienced due to the isolation of wrong equipment from electricity which is being caused by poor labeling systems of the equipment.

4.3 Frequency and Trends of accidents at SZCC

The lost time injury frequency rate at SZCC regularly per year is more than 3% against NSSA of less than 1 per year (Chaitezvi 2014). The 2013 strategic report at SZCC, showed that about two workers are injured per week and 10 workers are involved in near miss cases which shows the high prevalence of accidents in the organization. The 2011 SHE report indicated that approximately 70% of the reported severe accidents at Sino –Zimbabwe Cement Company occur at the Grate Cooler where people are often working at dangerous heights or at risk of being struck by falling object. According to SZCC annual S.H.E report 2009 a total of 2 people were killed in the Grate Cooler. Questionnaire responses however show that 80% of the workers said that they often experience accidents monthly this could be because the workers are only notified serious or near fatal accidents. 14% of the workers showed that accidents occur once per fortnight which shows variance of the number of accidents per section. 5% of the workers mentioned that accidents occur daily which indicates that not all accidents which occur at the organization are reported.

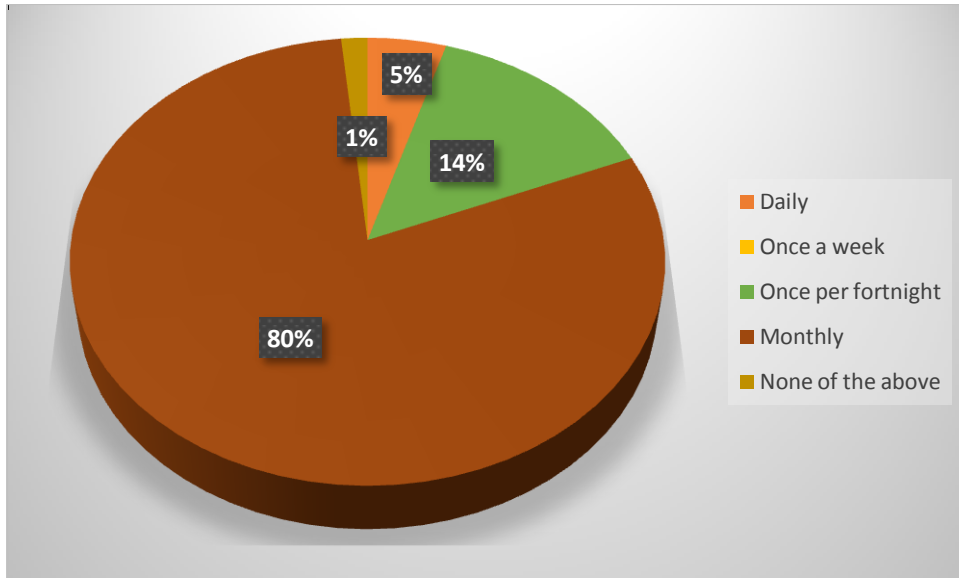


Fig 4.4 Percentage of the frequency of accidents

Secondary data from SZCC showed that since 2009 to date the manufacturing company has recorded a total number of 731 accidents. Of the 731 accidents, 221 were property damages, 239 medical treatment cases, 175 first aid cases and 96 lost time injuries respectively. The accidents trends at SZCC shows that the rate accidents were occurring was higher in 2009 and 2010 as illustrated in fig 4.5. This was the stage in which the company was still introducing occupational safety and health systems. The trends showed that the level of adaptations by workers on the methods implemented to prevent accidents was very low. The decline in the number of accidents from 2011 to date replicates the level of responsiveness of the employees as the trend shows the level of understanding of the system. The data in fig 4.5 also assist the researcher to pinpoint factors affecting the effectiveness of the corrective action plans in accident prevention and also the area of weakness in the organization in terms of the control measures that are in place to reduce occupational accidents.

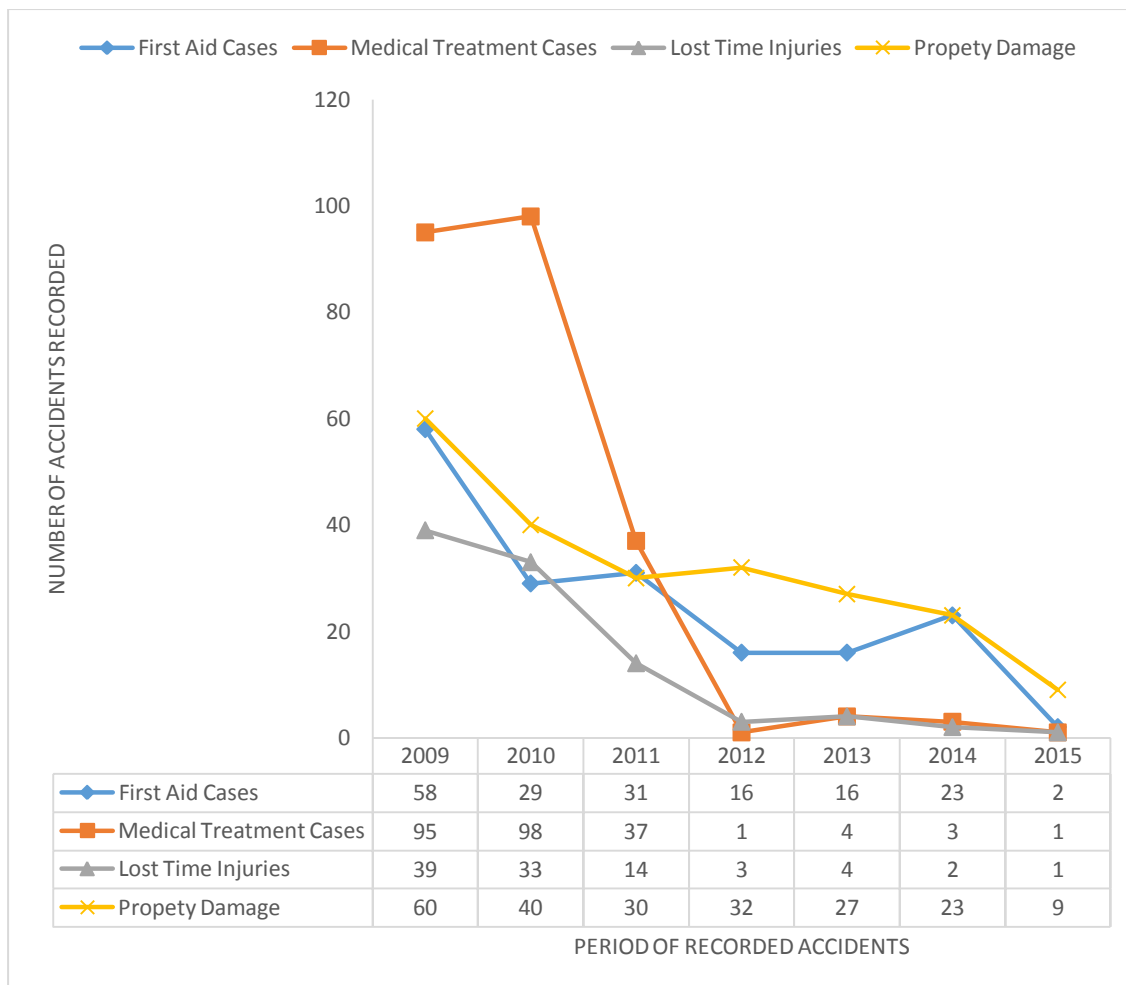


Figure 4.5 Trends of the occupational accidents at SZCC

Medical treatment cases are high severity cases where a wounded person seeks treatment from a specialized medical doctor (International Association of Geophysical Contractors et al., 2000). SZCC has recorded 239 accidents that were classified as medical treatment cases. In 2010 medical treatment cases gradually increased this could be alluded to the resistance to adopt to the new safety system which had been introduced. From 2011 there was a drastic decrease in the number of medical treatment cases following the SHE policy which was enforced which stated that if one had more than 3 injuries he /she would laid off. From 2011 to 2013 shows that there are variations in the number of medical treatment cases which replicates that there are a difficulties in the monitoring and implementation of OSH systems in the organization.

Secondary data revealed that the Safety, health and environment section was adopted in 2008 and recording of accidents started in 2009. 221 property damages were recorded from 2009 to date and the figures are decreasing gradually from 2009 to 2011 due to the increased

awareness due to OSH systems implementation. The OSH system at SZCC mainly focuses on following the Zimbabwe`s safety requirements for operations they adopted the factories and works act and EMA act in their system in trying to alleviate accidents in the organisation. But slight increases in 2012 were experienced at SZCC which could have been attributed to personal factors by employees such as stress. Property damages have slightly reduced as compared to other trends of other injuries which shows that there is a poor risk assessment in place for these accidents would have reduced. Also the fact that property damages are still high could be due to the fact that the employees at SZCC are poorly trained or workers do not have the necessary skills to operate the equipment efficiently. Occupational accidents damages` property which causes work to stop. 85% of the questionnaires respondents revealed that property damages constitute to machinery and equipment are damaged and in some cases they are completely destroyed which leads to the reduction of equipment and in some instances production even stops like during the time when the stalker collided with the reclaimer. In sections like the stores and the warehouse there are breakages of end products due to lack of storage space. The Finance manager noted that almost all the equipment is insured and they lost about three thousand US dollars in a quarter owing to property damages. Thus, leading to increased costs of repairing the equipment

First aid cases radically declined from 2009 to 2010 due to the increased knowledge among workers of safety issues. From 2010 to 2011 there was a slight increase in the number of first aid cases which could be due to the nature of jobs the employees where being exposed to. In 2012 and 2013 the number of first aid cases remained constant which shows that the level of adaptation of workers to the safety culture had slightly increased. In 2014 there is a rise in the number of first aid cases which were recorded as this was the period when the company was refurbishing its plant. During this period workers were exposed to a lot of hazards and were working under enormous pressure which could have attributed to the increase in first aid cases. Also the rise of first aid cases could be due to the lack of experience of the new workers which were recruited after the retrenchment of unqualified workers.

Lost time injury is work-related injury impede an employee to do any the day after the occupational accident (International Association of Geophysical Contractors Consensus 1993). SZCC has recorded 96 lost times injuries from 2009. Trends shows that from 2009 to 2014 shows a gradual decline of the number of lost time injuries which can be explained by the fact that there was change in the implementing of OSH systems according to the SHE records. Records shows that when OSH systems were introduced they were a bit harsh for

workers whom were caught practicing unsafe acts were photographed and these photographs were displayed on notice boards. This inturn brought fear on workers and anger in workers which resulted in an increase of the numbers of injuries.

4.4 Causes of accidents

For easy analysis the researcher classified the factors contributing to occupational accidents which are job related factors and personal factors. The NSSA factories inspector alluded that classification of accident causation helps in the risk analysis and it easily highlights the major contributors of accidents in an organization. Respondents showed that 81.3% of the major causes of occupational accidents at SZCC were due to job related factors and personal factors constituted of 18.7%.

4.4.1 Poor standard procedures

Respondents revealed that poor standard procedure constituted to 10.2% of the accidents. From the respondents 53.1% acknowledged that they had adequate work procedures in place and 46.9% they said they did not have adequate procedures in place for they did not have clear procedures teaching them how to obtain critical jobs involved in their work. Responses from departments like the laboratory and engineering showed that they had applicable procedures. 69% of the respondents from the production section said that they did not have adequate work procedures. All workers from the production department however showed that they are not even aware of what a procedure is some even mentioned their motto as a procedure which reveals lack of knowledge. Work procedures were meant to diminish safety and health glitches that can emanate as a result of improper following of operational codes of practices. The SHE department is still formulating and implementing procedures in different sections according to the records at SZCC which shows why some sections do have adequate procedures and some do not. The production and quarry department which are high risk areas in the organisation do not have adequate work procedures which explain the high prevalence of accidents in these sections as compared to other sections.

4.4.2 Poor maintenance of equipment

8.5% accidents were contributed by poor maintenance of equipment as was indicated by the respondents. Workers at SZCC work with intricate machines and these machines tend to break down a lot which forces the plant to run in a breakdown maintenance mode. The poorly maintained equipment tend to pose hazards such as oil leaks which leads to falls. Equipment

should be properly serviced if not they are bound to cause accidents. The company faces a challenge that it imports all most all spare parts from China and at times the spare parts which will be needed for use will not be in store. The workers are forced to improvise in order for production to carry on like in plate 4.2 where a worker used an old cement bag instead of a throttle to cover the threads. That is short term measure which poses a lot of risks for if the cement bag wears it might result in the dismantling of the equipment.



Plate 4.2 An old cement bag used to cover threads of the C5 valve throttle

4.4.3 Production Targets

When a breakdown occurs workers are given unrealistic targets which forces them to practice short cuts which causes accidents and incidents. Workers will be under immense pressure in order to save time short cuts are employed in order to the job done quickly. These production targets shows that they contribute to 15.3 accidents at SZCC according to respondents. This leads to many unsafe actions. Short cuts are the major contributors of accidents in the organization. Most of the accidents investigations especially road traffic accidents indicated that workers will be fatigued when accidents occur due to unrealistic targets and long working hours during breakdowns. Unrealistic targets are mainly experienced by the production and engineering workers whom are responsible for the general upkeep of

equipment in the organization. Influence from supervisors causes workers to use equipment which is not applicable to do the job which are bound to cause accidents in the long run.

4.4.4 Inadequate risk assessment

From the questionnaire findings hazard identification risk assessment (HIRA) at Sino has now excelled and is better than before in some departments for it has managed to identify major causes of accidents. Findings from respondents revealed that 16.9% accidents were due to inadequate risk assessment. However respondents from the production department argue that the HIRA at SZCC is not effective at all for it is talked about but is not being practised and some employees from the section highlighted that sometimes no attention is given to the identified risks. That scenario encouraged as it compromises the safety and health of employees. From the findings as illustrated in fig 4.6, 39.1% of the hazard identification is being done by the safety representatives and by everyone. The responses given by the respondents showed that the workers do not know that it is everyone’s responsibility to carry out hazard identification before commencement of work. Hazard identification risk assessment assistances workers to be conscious of the hazards in the workplaces.

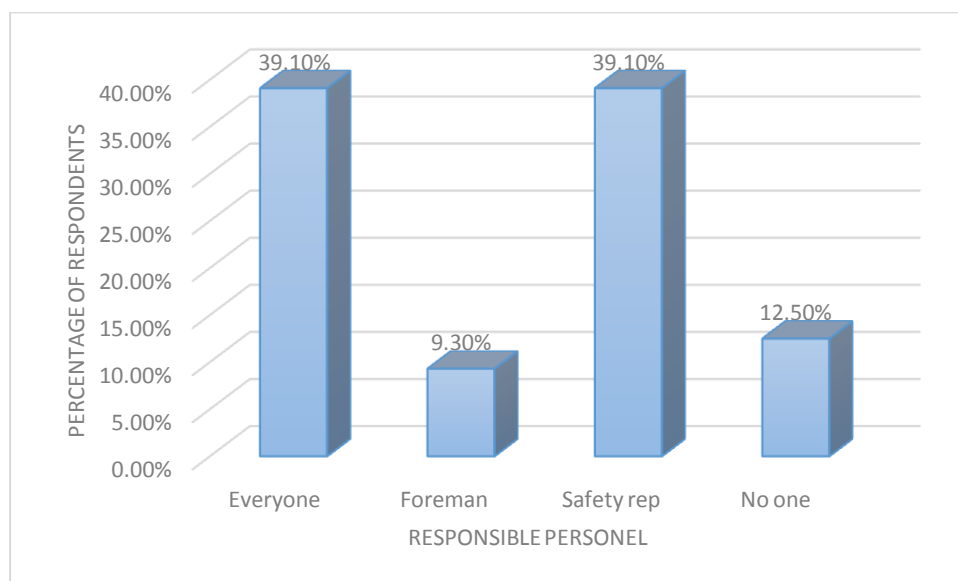


Fig. 4.6 Responsible personnel to carry out hazard identification before work

4.4.5 Lack of policy enforcement

8.5% respondents showed that lack of management control permits the existence of certain accidents and lower the operation of OSH systems at SZCC. Safety, health and environment system was adapted at Sino Zimbabwe Cement Company 2008 and up until now the workers

have not yet adopted the SHE systems because of lack of enforcement owing to the fact that the SHE section is understaffed. Quite a number of accidents which are being experienced at SZCC can be avoided but are being experienced due to lack of policy enforcement. The SHE officer has to manage the SHE issues from the quarry, cement production, canteen, garage and the administration which tends to place the SHE officer under enormous pressure. Although they introduced systems a few years ago they are still not adequate and due to the lack of enforcement. The SHE officer is being assisted by inadequate and inexperienced attached students who also need his guidance in their studies.

4.4.6 Lack of adequate training

Training at SZCC is lacking for workers only receive on job training courses. Questionnaire respondents shows that 22% of the accidents were due to lack of training. Findings from the research showed that 89% of the employees had undergone OSH training and 11% had received no form of training at all. The company had adopted both competence and awareness training programs to reduce the number of employees who may be involved in occupational accidents that are associated with cement production activities. The SHE officer alluded that recruited employees from the production go through safety induction for 3 days prior to the commencement of work. For other departments they undergo through safety induction for about three hours. The workers need to obtain inductions in their respective sections in which they will be working in order for them to be aware on what their jobs require out of them before the commencement of work for some employees do not even know the procedures in their sections due to lack of adequate training. Employees were taught on the dangers that might arise as a result of unsafe acts at the work place. All employees are prohibited to enter into confined space or a working premise if they were not sure if the environment is safe. Therefore, all workers took responsibility for their own health and safety. Workers need to be trained on issues to do with behaviour based safety and their impacts to easily adopt to the SHE system.

51% of the respondents had obtained safety induction which shows some of the workers were admitted in the organisation without being inducted though it is mandatory at SZCC that each and every worker is supposed to meet. 27% of the workers revealed that they had obtained a safety refresher course which shows that majority of the workers lack adequate training for these safety refresher courses help the worker to be well versed on the SHE rules and

regulations. 1% had obtained a first aid training and the majority of the workers had not attained the training which shows low levels of training in the organisation.

Training at SZCC is inadequate for workers are just trained basic safety skills during inductions. Workers need to be trained by external trainers like NSSA officials whom are well versed in SHE issues. Also failure by employers to invest in occupational safety and health and adopt a systems approach to ensure the safety and health of their workers is resulting in increased occupational accident occurrences at Sino Zimbabwe Cement Company. Poor management commitment is causing workers to work without adequate knowledge on how they are to safely conduct their jobs.

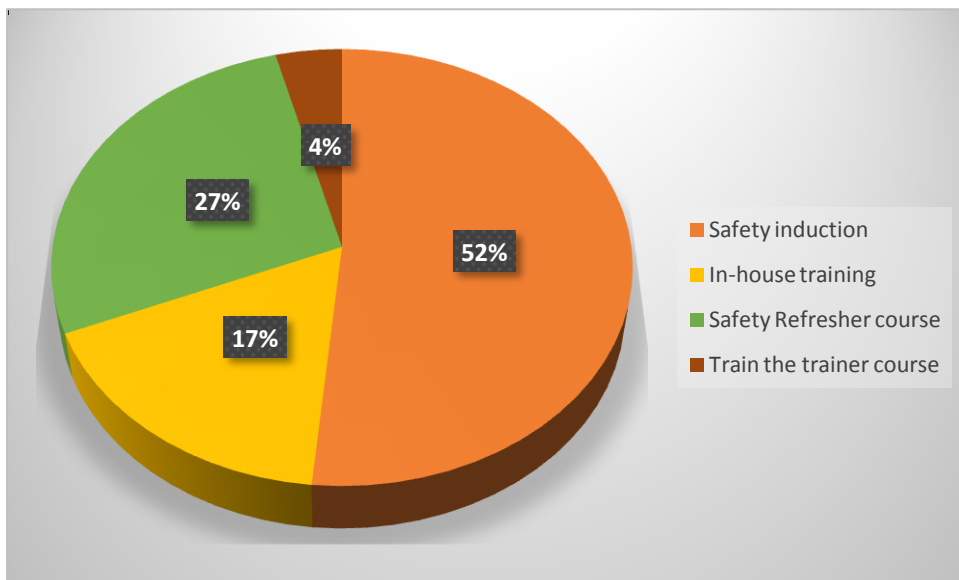


Fig 4.6: Types of OSH training courses attended by employees Sino Zimbabwe

4.4.7 Lack of experience or skill

Most of the workers being recruited workers do not have an industrial background. Lack of experience causes 3.4 % of accidents occurring at SZCC alluded the questionnaire respondents. When they are recruited it is assumed that the worker knows all the procedures in place in their sections though some of the workers are not well versed in terms of safety and health issues. A driver might be able to drive but cannot operate the equipment efficiently and safely if proper training is lacking. Quite a number of equipment at the organization are labeled or written in Chinese and new recruits find it difficult to operate

most of the equipment in the organization which increases the number of accidents caused by lack of experience.

4.4.8 Human error

It is one of the major causes at SZCC according to the Finance manager. Respondents revealed that accidents due to human error were 8.5%. Workers tend to operate equipment which they are not qualified to do due to the fact that there no rules in place which restricts workers to operate certain equipment. Quite a number of rigging accidents which results in workers being struck by falling objects are caused by workers operating equipment which they are not trained to do. Also human errors in the organization are caused by the fact that the workers work under the influence of alcohol especially road traffic accidents. Operation of equipment whilst under the influence of alcohol affects the judgement and visibility of workers which leads to occupational accidents.

4.4.2.3 Technical inability of the worker to obtain the job

Some workers at SZCC are physically not able to obtain some of their job requirements due to the fact that they are weak or sickly and respondents highlighted that it contributed 3.4% of accidents in the organization. The clinical records shows that on average about 2 workers fall of the loading bays on a monthly basis for workers cannot withstand the pressure of cement bags when loading. Thus they are pushed off the loading trucks falling on the ground in which they sustain injuries like lacerations and concussions. The human resources recruit workers without considering the nature of the job the worker is going to be doing. These physically weak employees should assigned to light jobs.

4.4.2.4 Inertia

Majority of the workers are generally resistant to change alluded the SHE officer. Respondents revealed that inertia contributed 3.4% of the accidents at SZCC. The human errors are also attributed by the fact that there is not adequate training of personnel apart from induction and safety refresher courses. Accidents however have reduced from 2009 to date which shows that the level of adaptation by employees to SHE issues have improved than was the issue before. Workers have an attitude problem where SHE issues are concerned they

think that safety rules and regulations are only applicable on paper rather than in reality. Some of the workers even argued during observations that they have been working in the organization for a period of 10 years and have been going for medical checkups for the past ten years and never have they been caught with pneumoconiosis and yet they never wear a respirator which shows that workers are resistant to change.

4.5 Usefulness of the strategies in place

Strategies in place are effective since they have managed to reduce the number of accidents from the previous year's especially road traffic accidents are being minimised by humps which force the trucks to reduce speed. Workers are being monitored and supervised during working hours which helps reduce accidents for if someone is caught doing something wrong they are corrected. Management conducts inspections monthly to identify hazards and to identify areas which need to be improved in terms of safety. Competitions are being held to boost workers to practise housekeeping everywhere they work. Workers are also being encouraged to work only if the environment is safe to do so and when they are fit to do the work.

After each and every accident people are being encouraged to be reported to the SHE officer immediately so that they can attend to injured person with immediate effect. After attending to the injured worker they form an investigation team to investigate on the causes and come up with mitigation strategies to avoid the accident to recur again. For example, to reduce road traffic accidents they have introduced speed limits and are encouraging workers with defective vehicles to be taken to the garage.

Conducting pre-shift safety talks helps personnel to start their work knowing fully well what is expected of them in terms of putting of people and all relevant safety issues which is reducing the occurrences of incidents. Research outcomes pointed out that all the departments were carrying out safety talks. Safety talks are being done five minutes before every work shift. These safety talks were held so as to remind workers to follow the SHE rules and regulations standards and practices as this could alleviate to accidents /incidents operational codes of practices. Workers were required to sign the safety talk attendants register during each safety talk they attend. The employees make use of the safety talks to air out their views and complaints as far as safety and health issues were handled at the organisation. Their complaints and suggestions assisted the company SHE Section in making continuous

improvements to the safety and health status of the company hence reducing accidents at their work place.

Due to the continued education practises and cautiontising workers on the actual causes of accidents absenteeism is reduced. The strategies put in place they act as the control factors as alluded by the SHE officer. The company is still processing the ISO 18001 certification. Responses from questionnaires shows that employees are not even aware whether the company is certified or not. The responses also shows that they are also not aware of what OSH standards are. The fact that SZCC is operating means that there are irregularities in their system for they do not comply with any statutory instruments such as OSHAS AND ISO apart from NSSA and EMA.

CHAPTER 5: CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The nature of accidents mostly recorded at SZCC lacerations, burns, falls, being struck by falling objects, arch eye, road traffic accidents and explosions of gases. The nature of accidents as revealed by respondents showed that accidents experienced at SZCC can be classified according to the nature of the injury and type of accident. From the study it was noted that the nature of occupational accidents varies at departmental level with the production section having more accidents as compared to other departments due to the nature of their job which is labour intensive.

The lost time injury frequency rate at the organization is 3% above the NSSA requirements. This was found to be mainly attributed by the lack of policy enforcement as most of the accidents occurring in the organization can be avoided but due to lack of knowledge in workers they are occurring. The findings showed that two workers are injured per week and 10 workers are involved in near miss cases which shows the high prevalence of accidents in the organization. Accident trends showed that the number of injuries have drastically reduced as was the case in the previous years. However property damages have reduced slightly which shows the workers lack experience in the operation of equipment in the organisation.

The study has shown that the major causes of accidents at SZCC are caused by both job related and personal factors. With job related factors contributing to 81.3 % of the accidents and personal factors constituted to 18.7% accidents. The major cause of accident was due to lack of adequate training. Job related factors were the major contributor to accidents due to the failure by employers to invest in occupational safety and health and adopt a systems approach to ensure the safety and health of their workers. The risk management system was found to be weak hence the high prevalence of accidents.

Efforts are being made by the SHE section to minimize accidents and injuries through strategies such as monitoring and supervision of workers during working hours and plant inspections by the management conducted on a monthly basis monthly. However the strategies adopted by the organisation are not effective in preventing accidents in the organisation due to lack of policy enforcement and workers showed that they are reluctant to take some of the safety precautions. Accidents continue to prevail due to the human errors. As noted by the finance manager that people came whilst under the influence of alcohol.

5.2 Recommendations

Having synthesized the data extracted during direct observations, interviews and questionnaires as well as from the company SHE documents, it turn out to be clear to the researcher that there are some zones which call for the company management's attention if SZCC is to become an accident free workplace. The researcher therefore recommends that

- SZCC should review and update risk assessments and work procedures
- Incentives should be given to departments or individuals for being more conscious of safety to motivate workers to work safely.
- Encourage employees to report accidents especially the minor ones since workers fear of being retrenched. Therefore, it is recommended that the company management make improvements on how to handle workers who are involved in an accident for all the accidents to be reported.
- SZCC should improve their technology by using automated loading instead of using manual mechanization to reduce accidents and near misses at the organization.
- Safety, Health and Environmental standards such as ISO 14000 series should be implemented in order to improve the safety system at SZCC.

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APPENDICES

Appendix 1

Questionnaire for employees

My name is **Rumbidzai Carol Samukange**, a final year **B.Sc. Honours for Geography and Environmental Studies student** at Midlands State University. This research is aiming to classify factors contributing to high prevalence of occupational accidents at Sino Zimbabwe Cement Company. For this study to be successful you are kindly requested to respond honestly and truthfully to the questionnaire. Your response to this study will be kept confidential and your contribution will be used only for academic purposes.

(Put ticks in the gaps provided and fill details in the spaces provided. In case of optional responses, cancel the unwanted response option)

Do you consent to participate in this research? Yes / No

SECTION A (PERSONAL DETAILS)

1. Gender

Female		Male	
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2. Age group of the respondent

18-30years		31-40years		41-50years		50years+	
------------	--	------------	--	------------	--	----------	--

3. Level of education

Tertiary		Secondary		Primary		None	
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4. How long have you been working at Sino Zimbabwe cement company?

0-5yrs	6-10yrs	11-15yrs	16-20yrs	21+yrs
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SECTION B

OBJECTIVE 1: To identify the occupational accidents associated with the cement production

5. Which department and section do you belong to?

Quarry		Engineering		Laboratory		Procurement and sales		Production	
--------	--	-------------	--	------------	--	-----------------------	--	------------	--

6. Which types of occupational accidents do you usually experience in your section?

.....

.....

.....

7. What might be the major causes of the above mentioned occupational accidents?

.....

.....

.....

OBJECTIVE 2: To establish the frequency of accident occurrence and the impacts to employees and the company

8. How often do you experience accidents?

Daily		Once per week		Once per fortnight		Monthly	
-------	--	---------------	--	--------------------	--	---------	--

9. What were the effects of the accident on

a) People?

.....

.....

b) Property?

.....
.....
c) Environment?
.....
.....

SECTION C

OBJECTIVE 3: To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures.

10. Do you carry out safety talks in your department? Yes No

If your answer to the above question is “yes”, how often?

Daily		Twice/ thrice per week		Weekly		Monthly	
-------	--	------------------------	--	--------	--	---------	--

11. Who is responsible for carrying out hazard identification before starting work?

Everyone		Foreman		Safety Representative		No one	
----------	--	---------	--	-----------------------	--	--------	--

12. How effective is the hazard identification risk assessment program at Sino Zimbabwe Cement Company?

.....
.....
.....

13. Does your section have adequate work procedures in place?

Yes / No

If yes which procedures are there in place?

.....
.....
.....

14. Did you receive any form of training?

Yes / No

If yes which form of training did you receive?

Safety induction		Train the trainer course	
In-house training		Safety refresher course	
Any other, specify			

15. What strategies were put in place to deal with occupational accidents with your work?

.....

.....

.....

.....

.....

16. How useful are these strategies explain

.....

.....

.....

17. Is the organization certified with OSH standards? YES/NO?

If YES provide the name of the standard(s).....

Appendix 2

INTERVIEW GUIDE: (SHE officer)

Objective 1: To establish the types and causes the occupational accidents associated with the cement production

1. Outline the types of occupational accidents usually experienced in your organization.
2. What are the major causes of the above mentioned accidents?
3. Which department has experienced high occurrence of occupational accidents and what might be the reason?

Objective 2: To establish the frequency of accident occurrence and impacts to employees and the company

4. How many LTI's have been recorded from 2009 to present day, due to occupational accidents and diseases?
5. On average how many absenteeism do you record per month related occupational accidents?
6. How much has been spent (monetary value) for occupational accidents?

Objective 3: To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures

7. What measures do you have in place to reduce or eliminate accidents?
8. In your own opinion, what is causing the continued prevalence of occupational accidents in the presence of these measures?
9. What do you think should be done to address the problem of occupational accidents?

Appendix 3

INTERVIEW GUIDE :(NSSA)

Objective 1: To establish the types and causes the occupational accidents associated with the cement production

1. Of all the recorded occupational accidents from **SZCC**, which types most frequently occur?
2. Which departments (s) mostly experience these accidents?
3. What might be the major causes of the above mentioned accidents?

Objective 2: To establish the frequency of accident occurrence and the impacts to employees and the company

4. How many LTI's have been recorded and from them, how many deaths and disabilities?
5. From 2009 to present day, how many penalties have been issued to the company and amounting to how much, if any?
6. How many workers have been given early medical retirement due to occupational accidents and diseases?

Objective 3: To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures.

7. What occupational strategies have you put in place to reduce accidents at cement manufacturing companies?

8. How effective are the strategies you have implemented?

Appendix 4

INTERVIEW GUIDE: (Industrial nurse).

Objective 1: To establish the types and causes the occupational accidents associated with the cement production

1. In your own opinion what are the causes of occupational accidents in your organization?
2. Which types of accidents do you experience in your organization?

Objective 2: To establish the frequency of accident occurrence and the impacts to employees and the company

3. How often do people get injured?
4. How many LTI's have been recorded from 2009 to present day, due to occupational accidents?

Objective 3: To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures

5. What measures or strategies have been put in place in order to reduce accidents and injuries at the organization?
6. What do you think should be done to improve the mitigation strategies?

Appendix 5

INTERVIEW GUIDE: (Financial Manager).

Objective 1: To establish the types and causes the occupational accidents associated with the cement production

1. Describe the nature of accidents experienced in your organization?
2. In your own opinion what could be the causes of occupational accidents?

Objective 2: To establish the frequency of accident occurrence and the impacts to employees and the company

3. How often do accidents occur?
4. How much has been spent (monetary value) for occupational accidents?
5. How does the occupational accidents affect the company financially?
6. How much has been spent (monetary value) for occupational accidents compensation since 2009-to date?

Objective 3: To assess factors contributing to continued prevalence of occupational accidents in light of existing mitigation measures

7. Why are accidents continuing in light of existing OSH measures?