

IDENTIFYING HAZARDS FACING WORKERS IN CEMENT FACTORY IN PRETORIA

Samuel, Segun Victor; Talukhaba, Alfred Atsango; Opaleye, Oladele Solomon
Department of Building sciences, Faculty of Engineering and the Built Environment, Tshwane University of Technology, Pretoria, Gauteng, South Africa

Abstract

The purpose of this study is to minimize the major hazards encountered by the cement factory workers. Cement workers are prone to hazards and these has potential cause to injury or illness which is the basic motive for this study. Hazards was identified and assessed, qualitative and quantitative methods are used in collecting data in this study. Data collection method are based on individual interview with the management, workers and the labour contractors in the factory. The researcher was able to get good response from the workers by assuring them that the information obtained from them would only be used for the study and that their employer will not have access to it. Some events photographs was taken as it buttress the authenticity of the study findings. The findings shows that workers encounter risks of throat cancer, reddish eyes skin problems and breath problem which was attributed to inadequate provision of PPE by the management and the contractors that directly employed these workers. The study recommended that safety performance should be improved by the stakeholders in the cement industry through effective monitoring visit by the department labour to cement factory, provision of PPE by the management, safety training programmes for workers, employment of competent safety personnel will enforcement safety compliance in the factory.

Keywords: Cement, Factory, Hazards, PPE, Safety

1 Introduction

Cement factories represent one of the most important strategic basic elements in the economic development of any country. Workers in this sector constitute an important productive aggregate in the community (David and Hamdy, 2005; and Baskett, 2007:7). Furthermore for period of time the national development was measured by production and consumption size of the cement (Pipilikaki, 2009). The cement industry operates in virtually all countries around the world; however more than 70 percentages of the global cement are produced and consumed in the developing countries where the cement development is much higher pace (John, 2003). This industry has all the features to be a successful sector especially in some developing countries, like South Africa.

Portland cement is the most commonly used today and is successor to hydraulic lime. The invention of Portland cement is usually attributed to Joseph Aspdin, who took out a patent in 1824 for a material that was produced from a mixture of limestone and clay. It is called “Portland” because the concrete made from it looks like natural stone from the Isle of Portland. Since Roman times, cement has been one of the synthetic materials with the largest production and widest usage by mankind. Its properties have allowed fascinating works till date. In the cement factory sector, workers exposed themselves to many occupational hazards that might

contribute to diseases and injuries at the cement factory but a considerable interactive effort with exchange of ideas in many organisations within and outside the cement industry have been trying the need of stressing on how to improve occupational health and safety performance for workers. Furthermore a periodic check-ups and early detection of hazards to monitor the health status of every cement factory work-related accidents and diseases continue to be a major problem in the world today, because the human and economic costs of occupational accidents and diseases remain high major tieback for cement factory (Abongomera, 2008:46). Working is viewed as important part of one's life experience of all adults, as most people spend about one third of their lives at work. About 45% of the world's population and 58% of the population over ten years of age constitute the global workforce Rogers (2005) and Gupta *et al.* (2007).

El - Sobky (2008), indicates that workers are exposed to many health hazards which are tremendously harmful on their health, these hazards may result from physical, chemical and mechanical agents, which could have a detrimental influence on their health. Cement can cause ill health in workers through skin and eye contact or inhalation. The risk injury attached to the cement factory workers depends on the duration and level of exposure and individual sensitivity. (Saucier and Jane, 2004:45). The term "cement" was derived from the Latin word *cementum*, which means stone chippings that were used in Roman mortar. This hydraulic cement was discovered during ancient Greece and Rome where it was made from volcanic ash mixed with slaked limes, and the Roman engineer Vitruvius describes the surprising properties of this mixture differed completely from all other materials and was even able to set under water by Smeaton, 1758. There are difficulties to determine the extent of work-related illnesses and diseases because of the delayed period of most occupational diseases on workers in the cement factory. Environmental Health and Safety Management (2009) explains that some of the diseases do not emanate on the workers' health quickly as expected. When the diseases finally manifest it is often difficult to trace the root causes to the workers' past exposure (El-Sobky, 2008:46). The International Labour Organisation (ILO) observed in 2008 that more than two million workers die each year from work-related accidents and diseases, and added that this is probably an underestimation. The ILO estimates that workers suffer 270 million accidents and at least 335 000 fatal injuries annually, while avoidable occupational diseases affect 160 million people every year. The results of a study by (McCann and Babin 2007:10) show a need for good dilution ventilation and additional protective gear such as goggles and NIOSH-approved toxic dust masks for workers in the chemical industry. This is very important for the cement chemical section; as such masks will protect the workers from hazardous toxic materials. Many cement factories around the globe are re-examining their factory operations in a fundamental way.

Many health and safety legislative and regulatory frameworks specify, in clear terms, how the employer must address any given condition. Taylor (2003:12) explained that the standards and regulations tend to support the traditional command-and-control, deemed to comply or prescriptive approach of addressing unsafe situations as well as existing and potential hazards, while ignoring the responsibility of the employer in addressing unsafe worker behaviour, cement Factory have started making significant changes to their policies and commitments to health and safety strategies to improve the sustainability of cement production, providing and enforcing prescriptive rules and procedures that promote the safe behaviour of workers (Haupt, et al, 2001:3).

1.1 Research Problem Statements

The cement is mostly found everywhere in everyday life and it is hard to imagine a modern society without it. But workers in these cement factory are exposed to many occupational hazards which contribute to work injuries, while some workers become allergic to chromium content in cement component. A significant percentage of all workers in cement factory are

allergic to chromium dust particles in cement, these cement dust particles symptoms ranging from a mild rash to severe skin ulcers. (Zuskin, et al., 2007), reported that cement, had a significantly higher prevalence of chronic cough, chronic bronchitis, hearing disorders and chronic sinusitis attacking workers health in workplace.

In order to achieve comprehensible understanding of the cement industry features, and all effective factors during the production process; this attempts give a clear picture of the cement production problems occurrence. Furthermore it shows that both workers and people living in the vicinity of cement factories are at risk, as it has been suggested that the components of cement dust can be airborne and inhaled. When the cement dust enters the bloodstream it is transported to the different tissues of the body, including the liver, spleen, heart, bone, and muscles. This could affect the physiological micro-structure and performance, and if an irritation of the eyes is not treated immediately, chemical burns leading to blindness can be caused (Saucier and Janes, 2004). According to Baletic, et al., (2005), indicated in their study that most of the avoidable hazards were caused by level of workers education that made most of them not understanding the safety rules in the safety hand book given to them at the commencement of their duty at the cement factory, 86% of workers had primary education, while 1% is semi-qualified and 13% are qualified workers in cement factory. As such the study shows workers' exposure to various occupational health hazards that causes various kind of illness in the cement factory workers' health, these are physical, chemical or accidental due to mechanical hazards and other health problems. The physical hazards show that ear problems are the most common physical hazards observed in the cement factory, this was followed by high blood pressure of the workers. Slightly less than one quarter of the studied sample were exposed to fractures because of accidents, followed by falling object. Also, slightly less than one fifth of the studied samples were exposed to eye problems, followed by haematological disorders. However, it is very difficult to convince employee, management and sub-contractors that the improvement of working conditions could be profitable and that the improvement of health and safety at work could generate enormous economic benefits; not only for the factories, but also for society as a whole (Mansour, 2008:9).

The primary objective of the study is to improve management awareness of workers' health and safety in the cement factory.

The secondary objectives of the study are as follows:

- To investigate how management can improve workers' health and safety.
- To identify the hazards that workers are exposed to at work.
- To evaluate the magnitude of the hazards that workers are exposed to.

To improve management's accountability for supervision health and safety issues among workers, and management improvement on the health and safety issues in the cement factory. Major Key of the study is the health hazard to which workers are exposed to and how cement factory management deals with this issue, is a challenge. The implementation of health and safety policies, as well as the accountability of management toward the health of workers that relate to cement factory, this hazard requires study.

2 Literature Review

Cement can be defined as the critical ingredient in concrete, locking together the sand and gravel constituents in an inert matrix; it can be referring to as 'glue' which holds together modern society infrastructure. The cement industry is one of the oldest industries in the world. The demand for the cement has risen rapidly over the last decades to become the second substance after water (Hsiao & Armstrong, 2012: 28). The industry is high intensively of raw materials and energy with fuel accounting for 30-40% of the production costs. Cement has been

made since Roman days, but over time the recipes used to produce cement have been refined and earliest cements were produced from lime and pozzolana called volcanic ash, containing significant quantities chemical mixture with ground brick and water. Moreover this cement was not improved until 1758, when Smeaton" noticed that using a limestone that was 20 - 25 % clay and heating the mixture resulted in cement could harden under water. He called this new cement 'hydraulic lime. Furthermore when the mixture was heated, a small quantity of it was sintered. Normally this was discarded as waste, but in the 1800s Aspdin and Johnson, discovered that when the entire batch was sintered and then ground superior cement was formed and produced. This further research substance became designated as Portland cement after the region in which they were working; today this is the most common cement in use.

Production of cement deals with raw materials and the main raw materials used in the cement manufacturing process are, limestone, sand, shale, clay, and iron ore. Another source of raw materials is industrial by-products to replace natural raw materials this is key element in achieving sustainable development of cement production. Cement is produced through a series of processes including quarrying, crushing, milling, blending and kiln burning, to form clinker cement. During all these processes accidents cannot be avoided, due to the ever-increasing pace of production activities. There are two main types of cement, natural and artificial. The natural cement is obtained from natural material having a cement-like structure and requires only calcining and grinding to yield cement powder, while artificial cement is also called Portland cement, there are different types of Portland cement such as Ordinary or Rapid hardening, Sulphur resisting, White coloured, Low heat, Masonry, Hydrophobic, Water replant, Expanding and non-Shrinking, High aluminium, Blast furnace and Oil well. All these are produced under consideration of different substances especially the limestone and clay, which are heated into a chemical reactions which take place, during heating process this produces four major phases which are known as Tri-calcium silicate, Di-calcium silicate, Ferrite phase and Tri- calcium aluminates phase (Hsiao and Armstrong, 2012:7).

Hamdy (2007) in his own research revealed that Cement mill workers are exposed to dust at various manufacturing and production processes, such as quarrying, handling of raw material, grinding clinker, blending, packing and shipping of the finished product, he also submitted that those workers who are exposed to such hazards in their workplace are more exposed to health hazards. In recent times the disastrous accidents in Bhopal (India) and Chernobyl (Ukraine) had a death toll of an estimated 4 000 and 10 000 persons respectively in 2000. In addition, there were around 5 200 workplace fatalities and 3.9 million workers suffered disabling injuries in the United States. This clearly demonstrates that the problem of workplace accidents and safety is a pressing issue. Noise is also major hazard encounter during the production of cement; milling plants used in grind the cement product causes high tension of noise this can simply damage someone hearing Levels, maintenance and cleaning personnel worker are mostly at risk. Improved noise personal protective equipment is also helping reduce the effects of exposure, and a whole body vibration is another issue in cement factories. (Beach, 2009), explains that age actually had stronger effect upon accident rate in the workplace. The United States Department of Health and Human Services (USDHHS, 2000), reported that workers having years of experience more than 10 years were more exposed to hearing serious effects. Though work-related diseases are amenable to prevention through recognition, evaluation and control of the hazards in an ideal world and effective practice of occupational health and safety has yet to be fully adopted in these developing countries. Baloyi (1991) identified the following as some of the main reasons for not implementing the safety policy by most developing countries: lack of effective enforcement system, lack of information and accurate records of occupational diseases and accidents with lack of basic professional training lack of risk management, risk engineering, risk control in occupational health and safety of cement factory.

Evelyn, Florence and Adrian (2005), presented the results of a postal survey of contractors in Singapore, where the findings revealed that factory accidents are more likely to happen when there are inadequate factory policies. Moreover, the health and safety policy statement should contain the aims which are not measurable and objectives which are measurable of the organisation or factory. The aims will probably remain unchanged during policy revisions, whereas objectives will be reviewed and modified or changed each year. These statements should be written in clear and simple language so that it is easily understandable (Phi Hughes *et al.*, 2001). These following points should be considered when a health and safety policy statement is drafted:

- The aims should cover health and safety welfare and relevant environmental issues.
- The position of the senior person in the organisation or company who is responsible for health and safety (normally the chief executive).
- The names of the health and safety adviser and any safety representatives.
- A commitment to the basic requirements of the Health and Safety at Work Act, for example, risk assessments, safe plant and systems of work, transport and handling of articles and substances, information, training and supervision.
- Using a safety committee or plant council.
- Specific policies of the organisation.

Risk engineering is one of the department found in the cement factory, generally it involves the use of engineering measures to reduce or eliminate risk in any factory sector. The control measures used by management as a link between risk control and risk engineering take into account that if hazards are controlled then the associated risks will be minimised. A range of counter measures is available to lower workers' risks. They involve reviewing the tasks, engineering, guarding, methods, training, Personal Protective Equipment policy, substitution, shielding, practices, information, and worker behaviour (Flanagan, as cited by Radevsky, 2011:3). Risk engineering is also a process in which a risk engineer undertakes surveys at regular intervals during the project life cycle. The main purpose of the process is the prevention of losses by examining the performance and progress of the works, identifying key areas of risk, providing recommendations, analysing losses and sharing lessons learned with the operational teams. This is achieved through regular visits to the site and a discussion of the recommendations with the workers (Radevsky, 2011:4). Another purpose of risk engineering is that of reporting the progress to the management, including recent or imminent changes and highlighting problems that have been encountered, discussing delays that have been faced and how the workers responded to them; and noting the responses to any recommendations made during previous surveys. To accomplish this, information is gathered before, during and after cement factory visits. Subsequently, a report is produced which is sent to the workers and the management (Radevsky, 2011:5).

It is important to imbibe risk control by eliminating or reducing the risk of a person being injured or harmed. The order in which controls should be considered is elimination, substitution, isolation, engineering control, administration control, and personal protective equipment. It should be noted that more than one control can be used at any given time to reduce the exposure to a hazard resulting from manual handling (DoL, 2011:8). The management of Health and Safety at Work Regulations 1999 of the UK states that risk assessment should include, firstly, a record of the preventative and protective measures that are in place to control the risks, and, secondly, what further actions, if any, are to be taken to reduce risk sufficiently (Cooke and Williams, 2009: 247).

Preventative and protective measures are often referred to as control measures; the purpose of this is to reduce worker risk. This is not always achievable; therefore, further measures may

need to be implemented to control any residual risks (Chihuri and Pretorius, 2010: 57). For example, a measure might be to provide workers that work at heights with safety harness for a particular work. However, there is still the risk that the workers will not use the tool correctly. The residual could be minimised to an acceptable level by employing a foreman to supervise the task of ensuring that the worker safety regulations are adhered to (Cooke and William, 2009: 248). Risk cannot be eradicated, but it can be managed (Chihuri and Pretorius 2010: 69). Furthermore, it is better to be proactive than reactive. Risks have to be identified, quantified and understood for them to be effectively managed (CIDB, 2004:1). Risk management now serves as an iterative process consisting of distinctive steps which, taken in sequence, support better decision-making by contributing a greater insight into risks and their impacts. The risk management process can be adopted in any situation where an undesired or unexpected outcome could be important or where opportunities are identified (Dey, 2010:69). These address the importance of risk identification and risk analysis in the cement factory. The cement factory is ideal example of the continuous industry sector and it will be used to demonstrate that the lean philosophy is applicable to all deferent organisation types. There are numerous challenges facing the cement factory in today's competitive environments; one of the major challenges is the capability of the cement factory to adopt safety enforcement to sub-contractors and introduce the improvement approaches and techniques by which the overall enhancement can be achieved.

3 Research Methodology

To achieve the objective of this research qualitative and quantitative method was used, 48 workers, 10 contractor and 15 management staff were interviewed. This method offers sufficient flexible results for all the research questions and objectives of the study were addressed, the relevant areas of data collection, the interviews were tape-recorded to secure an accurate account of the conversations and avoid losing data since the entire conversation cannot be captured during an interview by other means. Observations was also made by the researcher so as to obtain useful information that will proffer result that can address the problem identified in the study. The researcher observed both physical setting and environment within which the cement factory workers activities took place.

4 Data Collection

Data was collected through interview and observation from the cement factory, workers, contractors and management were randomly interviewed on different days based on the activities of each worker on their workplace, the qualitative method was used in collecting information from the targeted group; observations are also importantly made on the attitude of workers and their employers concerning the safety of the workers on the cement factory used in this study. Interviews and observations are popular means of obtaining information from people (Noor, 2008: 1603). The interviews was tape-recorded to secure an accurate account of the conversations and avoid losing data as stated above since the entire conversation cannot be captured during an interview by other means, journal and textbook to find answer to the objective of the study and explain improvement to workers about health and safety. The approach used in this study was qualitative in nature. The researcher made use of the simple random sampling within the category of the probability sampling methods. According to Ogbeide (1997), the justification for this kind of technique allows every subject in the sampling frame an equal opportunity to be selected without bias in an organized manner.

5 Findings and Discussion

It was observed that the management provided PPE to the permanent workers but left out other subcontractors` workers believing that their employer will provide them with PPE, the

management provided: Nose guard, Hand glove, Safety Hat, Safety Boot, Safety Gurgle and Ear noise guard. The researcher also noticed that some of the PPE given to the workers employed by the management are not properly used by their worker. Contractors hardly provide proper PPE stated above to their workers especially those workers at the production floor where there are inhaling of dust that affect workers' health. Out of the 48 workers interviewed 17 of them agreed that the management provided proper and adequate PPE while 10 workers neutrally agreed that management provided PPE but was not adequate and the remaining 21 workers believed that management did nothing in respect of the workers protection against hazards. The research sampling shows that workers that agreed to management provision of PPE but not enough are those contractors' workers that were opportune to get some of the PPE provided by the management and those workers that disagree are the workers that hardly get some of these PPE. In conclusion the following finding were made:

- Poor supervision of the workers at workplace;
- Risky behaviour of workers at the factory;
- Inadequate safety education, illustration and proper use of safety harnesses;
- Inadequate provision of safety harnesses;
- Employment of incompetent safety officers by the sub-contractors;
- The attitude of the management towards workers employed by subcontractors in respect of their H&S at the factory premises;
- Improper use of PPE by the workers;
- Provision of defective PPE by the sub-contractors to the workers;
- Improper use of workplace equipment (e.g., steel ladders) by the workers;

The demographic analysis below could also explain the numbers of the respondents in this study and their response to questions asked. On the side of the workers in respect of their responsibility to their health and safety protection at work, the following histogram in Figure 1 shows that large percentage of the workers did not comply with the health and safety at work.

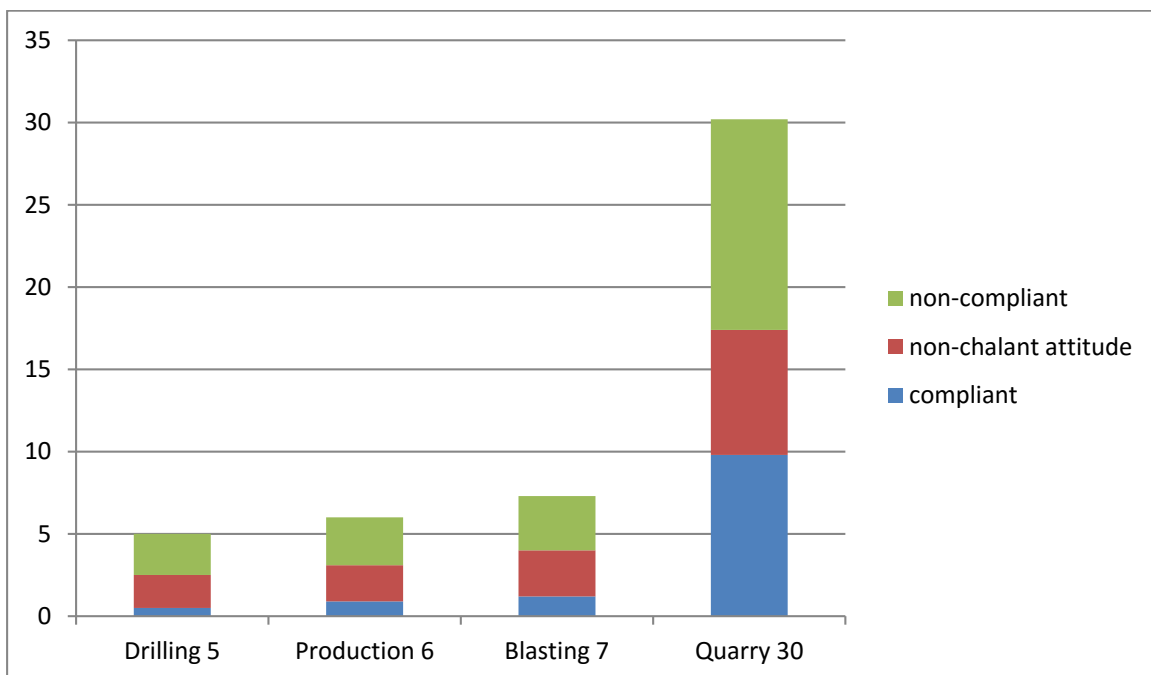


Figure 1. Workers attitude towards their personal protection

This question was asked and the sample result shows with the aid of histogram that out of the 48 workers interviewed 30 workers from the quarry as the highest percent of non-compliant in using the proper PPE while the others are in between. This shows that according to the result and observation in the factory contractors are the non-compliant figures in the issue on ground because they focus mainly on their daily target when job are being awarded to them.

6 Conclusion and Further Research

The data obtained in this research were based on the personal views of the participants, the observations of the researcher and not on any assumptions that may have been made by researchers about what the causes the workers hazards. The results indicated that serious injuries and death among the cement factory workers are caused by the findings mentioned above. Based on the above findings it appears that the major stakeholders concerned with the workers hazards at the factory workplace need serious redress, the shortcomings on workers hazardous issues at the workplace. Further research is being recommended by the researcher.

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