THE STATUS OF OCCUPATIONAL SAFETY AND HEALTH AND EFFECTIVENESS OF CONTRACTOR MANAGEMENT PROGRAMS AT KENYA BREWERIES LIMITED

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The Status of Occupational Safety and Health and Effectiveness of Contractor Management Programs at Kenya Breweries Limited

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DECLARATION

This thesis is my original work and has not been submitted for a degree in any other University.

Signature …… Date……

John Githiri Kimani

This thesis has been submitted for examination with our approval as the University supervisors.

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DEDICATION

First, all honor and glory to the omnipresent, omnipotent and omniscient God.

Secondly, to my parents Paul and Anastacia Kimani who taught me the true meaning of the famous Aristle's quote that; *"Education is an Ornament in Prosperity and a Refuge in Adversity"*.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF PLATES

LIST OF APPENDICES

LIST OF ABBREVIATIONS

DOSHS	Directorate of Occupational Safety and Health services
DSEAR	Dangerous Substances and Explosive Atmospheres Regulations
EABL	East African Breweries Limited
FAO	Food and Agriculture Organization
HDO	Hazard Datasheets on Occupations
HSE	Health Safety Executive
KBL	Kenya Breweries Limited
NIOSH	National Institute of Occupational Safety and Health
NISP	Nigerian Institute of Safety Professionals
OHSAS 18001	Occupational Health and Safety Assessment Series – Internationally recognized management system standard
OSH	Occupational Safety and Health
OSHA	Occupational Safety and Health Act
PPE	Personal Protective Equipment
SPMP	Safety Performance Management Program
WHO	World Health Organization
WHSA	Work Health and Safety Act

DEFINITION OF KEY TERMS/CONCEPTS

Adverse incident It connotes a catastrophic occurrence arising from workplace activities or the use of materials and machinery

Contractor Refers to a person(s) or company that is bound by the terms of a contract requiring the delivery of a service

Contractor management Refers generally to managing of outsourced work performed for an individual company. In the context of this study, contractor management programs are those systems deliberately implemented to manage contractors' OSH programs, such as welfare, training and insurance, pertaining to the respective contracts

Employee Refers to a person bound by terms of the contract of employment to work

Exposure Refers to a given amount of dangerous agent at the workplace that reaches a worker or the amount that has been absorbed

Injury This includes threats to one's physical health because of workplace exposure

Occupational hygiene Refers to the control and management of conditions that may cause diseases or adverse health problems to workers at the workplace

Occupier Refers to an individual(s) involved in the actual occupation of a workplace including the owner

Risk	It means the likelihood of an adverse effect occurring including its consequences
Workplace	Comprises land, building, location, vessel or thing, at, in, upon, or near which, a worker is, in the course of employment

ABSTRACT

Kenya Breweries limited is involved in the manufacture and sale of alcoholic and non-alcoholic beverages. A significant amount of work in this company is outsourced to contractors. The study sought to develop an in-depth understanding of the current safety and health management programs at Kenya Breweries Limited by examining the perspectives of staff and contractors who are certified to access the workplace. The study employed a descriptive cross sectional study design. Departments / sections of KBL were selected purposively and then grouped into 4 clusters namely; Engineering & services, Manufacturing, Sales-Marketing & Logistics and HR & Security. Data collection tools were questionnaires, observation and review of records. All data underwent scrutiny for logical inconsistencies; skip patterns and missing values. The percentages and their 95% confidence intervals (CIs) were presented. A total of 302(100%) workers participated in this study, of which 18% were fulltime KBL employees and 82% were contractors. The study showed that, 70.5% of the participants had college education and above although there was no significant association between educational level and awareness of OSH. There was significant association (p=0.00) between manufacturing department and workers educational level. Most (93.4%) workers were aware of all hazards in their respective workplaces although 1.3% confirmed that they were not aware of all hazards in their respective workplaces; 95.0% of workers confirmed that OSH policies were adequate. Majority (93.6%) confirmed that safety information was visible to all staff. The most prevalent cause of injury at KBL was established to be broken glass (cullet), accounting for 66.5% of all respondents who had sustained occupational injuries. About 84.7% of all the workers confirmed that introduction of contractor safety passport training was effective in improving OSH performance at KBL. For OSH training to be effective, the trained individuals should apply the knowledge at their respective work station which was evident in both cadres of staff at KBL. Introduction of contactor safety passport training and appointment of safety officers were identified as the most effective programs in improving OSH

performance, particularly of contractors. Records from the company point to a significant improvement of performance seen from accident statistics lens with over 81% reduction in accidents between 2010 and 2014. Further research is recommended in similar firms, so as to help in setting feasible benchmark for similar manufacturing industries.

CHAPTER ONE

INTRODUCTION

1.1 Background information

Work plays a central role in people's lives, since most workers spend at least eight hours a day in the workplace, whether it is in a factory, plantation or office. Work environments should therefore be free of occupational hazards in order to assure workers' safety and health.

Kenya Breweries Limited (KBL) specializes in manufacture and sale of branded alcoholic and non-alcoholic beverages. It is the principal subsidiary of East African Breweries Limited (EABL), a Kenya-based holding company with other subsidiaries specializing in similar business as KBL. A significant amount of the work at KBL is outsourced to contractors.

Like in any other employment sector, workers in breweries, especially contractors run an equal if not higher risk of being injured as a result of the type of work they do. The main risks they are exposed to include; manual handling - especially of kegs and crates of beer; slips and trips (90% of slips are on wet surfaces), people being struck by moving objects, including falls of articles (sometimes from vehicles); falls - especially from vehicles, stairs, ladders and work platforms; and vehicles - especially fork-lift trucks. Other hazards include dust, chemical, biological agents and unfavorable working conditions like high temperatures (WHO, 2010).

Training of employees on matters related to occupational safety and health is a statutory requirement in Kenya as stipulated in the Occupational Safety and Health Act (OSHA 2007). Permanent employees are trained by the company while contractors are required to be trained by their employer / contractor although they are more often than not on

temporary engagement. Yet this is not the case for many workers especially contractors hence there is need to involve contractors in OSH suitable management programs.

1.2 Problem statement

Contractor workers in KBL are exposed to several hazards in the course of their work including manual handling, inhalable dust, heavy plant and machinery, extremes of temperature, as well as slip, trip and falls. Workers normally load or offload tens of trucks manually; most of those workers are paid according to the number of trucks offloaded; in other words, on piece rate. As a result, there is a risk of workers straining themselves by working for long hours in order to increase their daily earnings. Most of the process plant and machines such as bottle fillers are known to produce noise levels as high as 85 dB(A). Exposure to manual handling, inhalable dust and noise may lead to musculoskeletal disorders, acute respiratory disorders and hearing impairment respectively.

According to OSHA (2007), factory workers are expected to be trained on safe work practices for example identification and control of occupational hazards yet this may not be the case for all workers at KBL. Additionally, all factory workers are expected to observe safe work procedures in their daily work schedule but in some cases this may not be so as workers may be seen operating machines without guards or working without appropriate PPE. Many business enterprises also pride themselves to have implemented (and certified to) robust, internationally recognized management systems such as OHSAS 18001. Despite these developments, the emerging trends show a high number of reportable occupational accidents and illnesses at KBL, this in a setting where accidents involving contractor employees probably go unreported.

It is therefore not clear whether the employees are aware of what is required of them or they are ignorant of the safety work procedures.

1.3 Justification and significance of the study

The management of KBL and its contracted companies aim to maximize productivity from their workforce and equipment in the quest for optimum profits. There are however a number of occupational risks affecting both permanent employees and contracted workers which could potentially lead to decreased employee productivity. The Occupational Safety and Health Act (2007) and related subsidiary legislation state that it is the employer's obligation to provide a safe working environment for the workers. These regulations further clarify that it is the duty of the employer to disclose accident statistics and to keep appropriate records. An employee should be informed of the dangers that are imminent in their work. These statutes further stipulate that this information should be posted in prominent areas where all workers can access. There is need for worker participation in setting up, monitoring and maintaining safe systems. According to a study by Towers (2003), it is important to empower, educate and persuade workers to exercise their powers in the protection of their safety and health. There is need for workplace improvement in terms of occupational safety and health for the benefit of the employer and the employee in order to increase productivity. It is therefore important that these problems are examined to come up with control measures, which should include employee participation and investment in occupational safety and health programs to protect the lives of the contract workers in KBL. Safety and health initiatives should not only focus on full-time employees, but they should also involve workers employed by contractors as a way of achieving zero harm or zero accidents, injuries and ill health problems. Further, an insight into the development and implementation of contractor safety and health management and training is a critical need in the face of an increase in the rate of occupational injuries and illnesses in various industries and business organizations. According to Burke *et al.,* (2006), employee involvement and training is one of the best ways through which organizations manage to reduce the costs associated with adverse work-related events such as diseases and injuries. More specifically, the use of comprehensive and systematic ways of evaluating

the extent to which employee safety and health involvement / training programs achieve their intended purposes is an effective way of addressing such public- and private-sector issues.

Against this background, the study sought to provide more insights into the effectiveness or lack of effectiveness of the contractor employee safety and health training programs at KBL, one of the leading manufacturing enterprises in Kenya. Further, findings from this research will form a sound basis for the development of an evaluation criteria that could be applicable to similar enterprises.

1.4 Research Questions

i. What is the level of awareness of OSH hazards among workers at KBL?
ii. What is the level of awareness of OSH control measures among KBL workers?
iii. What is the nature and frequency of accidents / injuries, their causes and control at KBL?
iv. What is the effectiveness of contractor management programs on occupational safety and health at KBL?

1.5 Objectives

1.5.1 Main Objective

To evaluate the status of OSH and the effectiveness of contractor management programs at KBL.

1.5.2 Specific Objectives

i. To determine the awareness of OSH hazards faced by all workers at KBL.
ii. To determine the awareness of OSH control measures in place among all workers at KBL.
iii. To establish the nature and frequency of accidents, causes and control at KBL.

iv. To evaluate the effectiveness of contractor OSH management programs at KBL.

1.6 Conceptual Frame Work

A conceptual framework is used in research to outline possible courses of action or to present a preferred approach to an idea or thought. They can act like maps that give coherence to empirical inquiry. Because conceptual frameworks are potentially so close to empirical inquiry, they take different forms depending upon the research question or problem. This study's conceptual framework illustrated in Figure 1.1 was built on the premise that several key factors shape the overall occupational safety and health performance of an organization namely, organizational OSH characteristics - corporate policies and regulations, nature of hazards and their control, injuries and ill-health prevention measures and contractor management programs. The latter which forms the main basis of this study was indeed an emergent factor made even more critical by the contracting trend gaining currency in most organizations. Variables were used during analysis to determine the level of significance at 95% confidence interval.

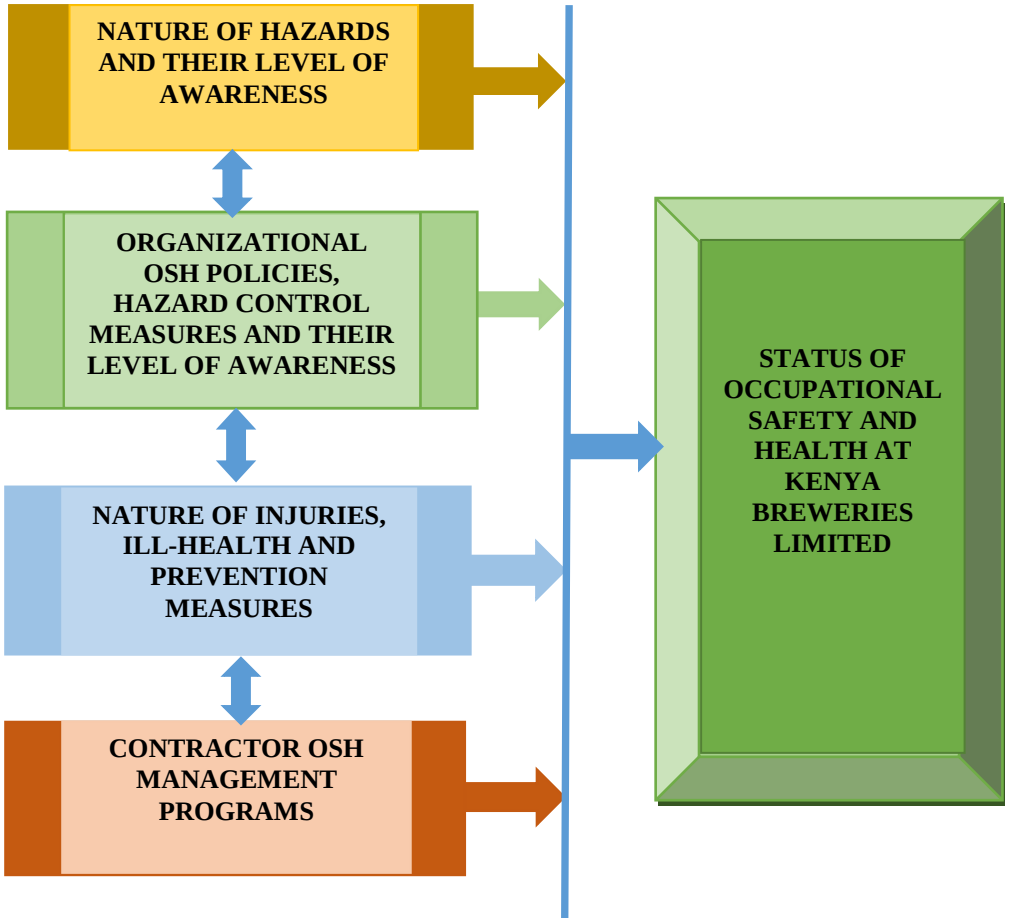


Figure 1.1: Conceptual framework

CHAPTER TWO

LITERATURE REVIEW

2.1 Brewing industries

The brewing industry has historically been a local industry with only a few companies having a substantial global presence. However the last couple of decades have seen increasing consolidation with the industry leading to emergence of global multinationals. Here in Kenya, KBL, a subsidiary of East African Breweries Ltd (EABL) is the leading branded alcohol beverage business. EABL is listed on the Nairobi Stock Exchange and is East Africa's second largest company by market capitalization, commanding over 50% alcoholic beverage market share in the region. KBL brews among other brands, Tusker, the most popular beer in Kenya and a source of Kenyan pride – it's main competition being South African Breweries Castle Lager. Kenya Breweries has been the dominant brewer in Kenya since it began operations in 1922. The brewery is located in Ruaraka, in Nairobi and has a total brewing capacity of about 5,000,000 hectoliters annually. A new entry into the Kenyan beer market is Keroche, who own a brewery in Naivasha. Kenya's per capita beer consumption is around 12 liters a year, compared with 58.2 liters in South Africa.

Alcoholic drink production requires only a few raw materials; cereal grain, yeast plus water, which are heated, fermented, matured and decanted, producing ethanol liquor. Thus, it would appear only the final product is flammable and if the ethanol is sufficiently diluted, in the case of beers, lagers and other alcoholic beverages, no flammable atmospheres exist. These industries are classified as food industries therefore laws and regulations governing food industries are also applicable (FAO, 2002; Mugabe 2012). In Europe the brewing industry is morally and legally obliged to provide safe and wholesome products and to ensure food safety throughout the supply chain. Whilst beer is an inherently safe product it may, nevertheless, be contaminated by foreign bodies and

chemicals at various stages within the process. Dangerous Substances Explosive Atmospheres Regulations states that a systematic hazard and risk assessment has to be undertaken to ensure personnel and the public are not at risk from fire and explosion (DSEAR, 2002).

2.2 High Demand and lack of Training as Risk Factors in Breweries

As one brewery safety consultant explained to Reuters, part of the reason that safety measures may be lacking at craft breweries may be the fact that smaller operations are often run by entrepreneurs who are not trained in industrial safety (WHO, 2000). Compounding the problem is the fact that, as breweries' sales grow, workers may face a higher risk of injury as a result of mounting pressure to work quickly and keep up with demand. Additionally, larger breweries may see fewer worker injuries as a result of increased automation. At smaller craft breweries, more of the work must be done manually, creating a higher risk of employee injury. From 2003 to 2011, there were 547 safety violations reported at U.S. craft breweries, 250 of which were considered serious. Meanwhile, larger U.S. breweries had only 151 violations, 69 of them serious, during the same time period (Olsen, 2012).

2.3 Contractor Management

Contractors are engaged in different activities in any given organization including construction, transportation, cleaning services, electrical installations and mechanical maintenance (Gillen *et al.*, 2004; Filho *et al.*, 2012; Nunes, 2012; Olsen, 2012). Apart from the employees of the client organization and the contracted company, the current work environment comprises workers from third party companies (subcontractors) associated with the contractors because it is sometimes necessary to involve other people in effecting the terms of one's contract. Therefore, it is becoming increasingly important for industries and organizations in the public and private sectors to devise ways of managing their relationships with the contractors and other associated workers under the

subcontractors with the aim of ensuring that all workers pay attention to the existing policies and regulations regarding occupational safety and health.

Outsourcing (contracting) is the act of one company engaging another company to provide services that might otherwise be performed by in-house employees. Often the tasks that are outsourced could be performed by the company itself, but in many cases there are financial advantages that come from outsourcing. Many organizations are switching to the outsourcing of logistics as a way of re-modeling their distribution and transport management resulting into competitive advantages. In this era of intense competition firms are focusing on logistics outsourcing to contribute significantly to their presence and performance in the market and it is no wonder that in many organizations contracted workforce poses the biggest OSH risk, hence the need for dedicated management programs. For OSH issues to be effected among all cadres of workers, training and audits of occupational safety and health should be done in all departments and among all the workers regardless of whether permanent or contracted. Otherwise outsourcing might compromise OSH in a work environment especially when permanent workers are trained on OSH while contracted workers are not trained on the same.

2.4 Occupational Safety and Health Training Programs

Business owners, employers, and contractors are responsible for the safety and health of all workers including members of the public who occupy space within the workplace. Along this perspective, there is the imperative need for the client organizations to engage contractors including the sub-contractors in the development and implementation of the occupational safety and health training programs to eliminate unnecessary risks to workers and members of the public (Burke *et al.,* 2006; Fidderman & McDonnell, 2010). The effectiveness of worker involvement and training in reducing the risk of diseases and injuries to workers and the public comes through involvement. According to Reber *et al.* (1993), one of the major causes of industrial accidents and injuries stems

from the workers' activity or inactivity. While many industrial companies strive to address the actions or inactions of the workers, which may be at the center of accidents and injuries, through safety training and incentive programs, there is little evidence to show that such initiatives address the root problems.

2.5 Safety Performance Management Program

Under the Safety Performance Management Program (SPMP), Reber *et al.* (1993) propose that the effectiveness of a given safety and health management program entails targeting the specific safety and health needs of an organization, encouraging all workers to embrace safe behaviors at the workplace, and involving workers throughout the process of designing and implementing the program. The other attributes of an effective safety and health management program involve specifying the safety and health management rules/regulations in a way that will encourage behavioral change among the workers. Most importantly, Reber *et al.* (1993) assert that training workers via behavior modeling is the most effective way of managing occupational safety and health in an organization. This model of training uses videotapes or visual representations of safe behavior, which keep on reminding the workers of the need to observe and practice the new behaviors as a way of achieving the required level of performance. Therefore, performance-oriented training programs provide one of the most effective ways of encouraging workers to embrace safe and healthy work practices as opposed to passive or incentive-based training programs (Waterman, 2007).

2.6 Occupational Hazards

MacCollum (2006) postulates that hazards can be generally classified into 5 broad categories, thus; physical hazards (including mechanical hazards), chemical hazards, biological hazards, ergonomic (or physiological) hazards and psychological hazards. All these occupational hazards have the potential to negatively impact on workers' safety and health and by extension, organizational productivity.

Physical hazards are types of occupational hazards that involve environmental hazards that can cause harm with or without contact. They include ergonomic hazards, radiation, cold and heat stress, vibrations, moving parts of machinery, electricity and noise hazards. Engineering controls are often used to mitigate physical hazards. Chemical hazards are occupational hazards caused by exposure to chemicals in the workplace. Exposure to chemicals in the workplace can cause acute or long-term detrimental health effects. There are many types of hazardous chemicals, including neurotoxins, immune agents, dermatologic agents, carcinogens, reproductive toxins, asthmagens and sensitizers. These hazards can cause physical and/or health risks. Depending on chemical, the hazards involved may be varied, thus it is important to know and apply appropriate PPE whenever there is risk of exposure.

Biological hazards, also known as biohazards, refer to biological substances that pose a threat to the health of living organisms, primarily that of humans. This can include medical waste or microorganisms, viruses or toxins (from a biological source) that can affect human health. Ergonomic hazards are physical occupational conditions that may pose risk of injury to various parts of the musculoskeletal system such as the muscles or ligaments of the lower back, tendons or nerves of the hands/wrists, or bones surrounding the knees. Ergonomic hazards include things such as awkward or extreme postures, whole-body or hand/arm vibration, poorly designed tools, equipment, or workstations, and inefficient work method or process. Psychological hazards are created during work related stress or a stressful environment. A person can be a hazard when he/she is affected by psychological disturbance through stress, shift pattern, is under the influence of drugs, is ill or lacks adequate training.

According to the International Program on the Elimination of Child Labor, IPEC (2011) occupational hazards are a common source of injuries in many industries. They are perhaps sometimes unavoidable in brewing industries, but over time people have

developed safe work methods and procedures to manage the risks posed by hazards in the workplace.

2.7 Risk Factors and Safety Precautions

2.7.1 Manual Handling

Manual handling accounts for most of the injuries in breweries: hands are bruised, cut or punctured by jagged hoops, splinters of wood and broken glass. Feet are bruised and crushed by falling or rolling barrels. Much can be done to prevent these injuries by suitable hand and foot protection. Increase in automation and standardization of processes can reduce the lifting risks. The back pain caused by manual handling and so on can be dramatically reduced by training in sound lifting techniques. Mechanical handling of pallets can also reduce ergonomic problems. Falls on wet and slippery floors are common. Non-slip surfaces and footwear, and a regular system of cleaning, are the best precaution (Jeanne, 2007).

Handling of grain can produce barley itch, caused by a mite infesting the grain. Mill-worker's asthma, sometimes called malt fever, has been recorded in grain handlers and has been shown to be an allergic response to the Granary weevil. Manual handling of hops can produce dermatitis due to the absorption of the resinous essences through broken or chapped skin. Preventive measures include good washing and sanitary facilities, efficient ventilation of the workrooms and medical supervision of workers (WHO, 2000).

When barley is malted by the traditional method of steeping it and then spreading it on floors to produce germination, it may become contaminated by fungi, which can lead to spore formation. When the barley is turned to prevent root matting of the shoots, or when it is loaded into kilns, the spores may be inhaled by the workers. This may produce extrinsic allergic alveolitis, which in symptomatology is indistinguishable from farmer's

lung; exposure in a sensitized subject is followed by a rise in body temperature and shortness of breath. There is also a fall in normal lung functions and a decrease in the carbon monoxide transfer factor (Piombino, 2005).

A study of organic dusts containing high levels of endotoxin in two breweries in Portugal found the prevalence of symptoms of organic dust toxic syndrome, which is distinct from alveolitis or hypersensitivity pneumonia, to be 18% among brewery workers. Mucous membrane irritation was found among 39% of workers (Carveilheiro *et al.*, 2000).In an exposed population, the incidence of the disease is about 5%, and continued exposure produces severe respiratory incapacity. With the introduction of automated malting, where workers are not exposed, this disease has largely been eliminated (WHO, 2000).

2.7.2 Machinery

Where malt is stored in silos, the opening should be protected and strict rules enforced regarding entry of personnel into any confined spaces. Conveyors are much used in bottling plants; traps in the gearing between belts and drums can be avoided by efficient machinery guarding (Gunningham, 2008). There should be an effective lock-out / tag-out program for maintenance and repair. Where there are walkways across or above conveyors, frequent stop buttons should also be provided. In the filling process, very serious lesions can be caused by bursting bottles; adequate guards on the machinery and face guards, rubber gloves, rubberized aprons and non-slip boots for the workers can prevent injury (Lunt & Bates, 2008).

2.7.3 Electricity

An electrical hazard is a dangerous condition where a worker can or does make electrical contact with energized equipment or a conductor. From that contact, the person may sustain an injury from shock, and there is a potential for the worker to

receive an arc flash (electrical explosion) burn, thermal burn or blast injury. Owing to the prevailing damp conditions, electrical installations and equipment need special protection, and this applies particularly to portable apparatus. Extension cables and other flexible leads which are particularly prone to damage should be visually checked, maintained and where necessary replaced before using portable equipment. The ends of flexible cables should always have the outer sheath of the cable firmly clamped to stop the wires (particularly the earth) pulling out of the terminals. Lock-out / tag-out systems must always be utilized whenever groups are working on energized plant and equipment. Ground fault circuit interrupters should be installed where necessary. Wherever possible, low voltages should be used, especially for portable inspection lamps.

2.7.4 Carbon Dioxide and other Hazardous Gases

Carbon dioxide (CO_2) is formed during fermentation and is present in fermenting turns, as well as vats and vessels that have contained beer. Concentrations of 10%, even if breathed only for a short time, produce unconsciousness, asphyxia and eventual death. Carbon dioxide is heavier than air, and efficient ventilation with extraction at a low height is essential in all fermentation chambers where open vats are used (Jeanne, 2007). As the gas is imperceptible to the senses, there should be an acoustic warning system which will operate immediately if the ventilation system breaks down.

Cleaning of confined spaces presents serious hazards: the gas should be dispelled by mobile ventilators before workers are permitted to enter, safety belts and lifelines and respiratory protective equipment of the self-contained or supplied-air type should be available, and another worker should be posted outside for supervision and rescue, if necessary. Gassing has occurred during relining of vats with protective coatings containing toxic substances such as trichloroethylene. Precautions should be taken similar to those listed above against carbon dioxide.

Chilling is used to cool the hot wort before fermentation and for storage purposes.

Accidental discharge of refrigerants can produce serious toxic and irritant effects. In the past, chloromethane, bromomethane, sulphur dioxide and ammonia were mainly used, but today ammonia is most common. Adequate ventilation and careful maintenance will prevent most risks, but leak detectors and self-contained breathing apparatus should be provided for emergencies and frequently tested. Precautions against explosive risks may also be necessary (e.g., flameproof electrical fittings, elimination of naked flames) (Olsen, 2012).

2.7.5 Working in Extreme Temperatures

In some processes, such as cleaning out mash turns, workers are exposed to hot, humid conditions while performing heavy work; cases of heat stroke and heat cramps can occur, especially in those new to the work. Contact with hot water, steam lines and process equipment can result in serious injury from burns. Steam is used extensively, and burns and scalds occur; lagging and protection of pipes should be provided, and safety locks on steam valves will prevent accidental release of scalding steam (Johnstone *et al*, 2005).

Most burns occur on the hands, arms and face. Hot water used for clean-up or wash-down has also been known to cause burns on feet and legs. Heat sealers and glue operations on packaging lines also can cause burns (Piombino, 2005; Muchemi, 2012). These conditions can be prevented by strict adherence to safe work procedures and provision and use of recommended PPE.

Medical supervision is necessary to prevent mycoses of the feet (e.g., athlete's foot), which spread rapidly in hot, humid conditions. Throughout the industry, temperature and ventilation control, with special attention to the elimination of steam vapor and the provision of PPE are important precautions, not only against accident and injury but also against more general hazards of damp, heat and cold (e.g. warm working clothes for workers in cold rooms).

2.7.6 Noise Hazard

When metal barrels replaced wooden casks, breweries were faced with a severe noise problem. Wooden casks made little or no noise during loading, handling or rolling, but metal casks when empty create high noise levels (Mugabe, 2012). Modern automated bottling plants generate a considerable volume of noise. Noise can be reduced by the introduction of mechanical handling on pallets. In the bottling plants, the substitution of nylon or neoprene for metal rollers and guides can substantially reduce the noise level (Jeanne, 2007). Other hazards include fall from heights in the construction sites, fire, traffic related; onsite and offsite among others.

2.8 Safe Work Practices

A general program which addresses the various aspects of OSH is crucial to the improvement of overall organizational performance. In particular specific focus should be given to hazard mitigation programs which commonly include; use and selection of PPE, safe work procedures for high risk tasks such as entry into confined spaces, isolation of energy sources and dangerous parts of machinery, identification and communication of hazardous chemicals, self-inspection programs, hearing conservation programs, the control of infectious materials, process management and emergency response programs.

Training of workers in safe work practices is important in reducing worker exposure to hazardous conditions and injuries (Jeanne, 2007). Employers have duties concerning the provision and use of personal protective equipment (PPE) at work. PPE is equipment that will protect the user against health or safety risks at work. It can include items such as safety helmets, gloves, eye protection, high-visibility clothing, safety footwear and safety harnesses. It also includes respiratory protective equipment (HSE, 2006).

2.9 Enhancing Safety Culture at the Workplace

2.9.1 Risk Assessment

The work environment is an important determinant of individuals' safety and health. The influence can be either positive or negative and impacts the general safety culture within the organization (Danna & Griffin, 1999). Hazards and hazardous situations exist in all workplaces but these may be reduced to safe levels with proper occupational management systems. Some hazards are introduced by people while more often than not hazards arise from engineering activities such as planning, design, production, operations and maintenance. Several approaches have been developed for recognizing hazards and selecting controls. Brauer (2006) in developing principles of hazard control suggested that one should recognize hazards, define and select preventive actions, assign responsibility for implementing preventive actions and provide a means for measuring effectiveness. He further gave a set of five priorities for selecting controls which included eliminating the hazard, reducing the hazard level, providing safety devices, providing warnings and providing safety procedures (or protecting equipment).

2.9.2 Communication

According to a study that was done by Angelica and Vecchio (2007) communication allows people, tasks, processes and systems to interact purposively and cooperatively to achieve safety and health objectives. The way we communicate about safety will influence whether or not people will understand and participate in a safety process. Communication and consultation in the workplace, is integral in achieving safe work environment by giving and receiving information about hazards and risks control, influencing attitude, behaviors and building commitment and ownership. The internal communication types that can be used in the workplace include; presentation to senior management and staff health and safety committees, emails, videos, notice boards, newsletters, poster display and signage (Yin, 2003; Rivers, 2007).

External communication can be achieved by use of; annual reports, publications, telephone calls. It is important that information is presented in a manner recipients will understand (Vecchio *et al.,* 2004). People will contribute more in an environment with a frame work for consultation and communication that creates the conditions where individuals are encouraged to report hazards near misses and incidents (Standards Australia 2001).

2.10 Management of OSH at Kenya Breweries Limited

The occupational safety and health management system at Kenya Breweries limited is quite well developed with a fully-fledged safety department and OSH systems well integrated into all operations. This is primarily achieved through implementation of programs aligned with internationally recognized OHSAS 18001 management system standard to which the brewery operations are certified through the Kenya Bureau of Standards.

Consequently the company has a policy manual complete with OSH policy statement endorsed by top management and procedures stipulating all aspects of OSH performance including; risk assessment, occupational health, hazardous substances, emergency evacuation plans, fire prevention & management, hazardous tasks, management of contractors & visitors, accident reporting & investigation etc. In addition, KBL has implemented various programs under the Diageo's corporate Zero Harm safety slogan of "Everyone goes home every day, everywhere". The Zero Harm policy is built upon four pillars of Prevention, Compliance, Capability and Culture – each with specific programs aimed at safeguarding the occupational safety, health and welfare of all employees and stakeholders.

2.11 Legal Requirements on Management of Occupational Safety and Health

In Kenya, the Occupational Safety and Health Act (2007) provides guidelines for the management of occupational safety and health matters, specifically to safeguard worker safety, health and welfare. Enacted in 2007, the Act is complemented by several subject specific subsidiary legislations in form of legal notices with rules on first aid, fire safety, hazardous substances, safety committees, medical examinations, noise, plant and equipment inspections etc.

Section 6 of the Act stipulates the duties of the occupier which includes provision of a safe and healthy work environment, through conducting of a risk assessment, the basis upon which appropriate prevention and protection measures should be instituted. It further requires the preparation of an appropriate policy statement to demonstrate commitment on management of OSH matters pertaining to staff and other stakeholders. Section 9 calls for the establishment and training of a committee to be charged with the responsibility of overseeing OSH matters, not least of all conducting regular workplace inspections to identify and address occupational hazards.

Sections 14, 21 and 22 specify that accidents, diseases and dangerous occurrences need to be recorded on the general register and gives guidelines for reporting of the same to the Directorate of Occupational Safety and Health Services. On general health provisions, section 47 specifically requires that every workplace be kept clean and free of effluvia arising from any drain, sanitary convenience or nuisance. Section 48 requires that every workroom be free of overcrowding with for example minimum workroom height being set at 3 meters measured from the floor to the lowest point of the ceiling.

Machinery and plant must be designed, maintained and inspected accordingly, the latter by approved persons as specified in sections 55 through to 72, in such a manner so as not to fail in use and cause accidents or injuries. Section 78 to 82 gives guidelines on fire safety including appropriate infrastructural considerations for stores holding

inflammable materials which must be fire resisting and design of appropriate evacuation procedures which must be subject to regular testing.

On chemical safety, there are clear guidelines in sections 83 to 90 ranging from handling, transportation, labeling as well as prevention of exposure through provision of exhaust systems. General welfare requirements stipulated in section 91 to 96 include the provision of appropriate PPE and their accommodation facilities, potable drinking water, first aid facilities and permit to work system for hazardous tasks.

CHAPTER THREE

MATERIALS AND METHOD

3.1 Study Design

A descriptive cross sectional design was employed in this study. This type of research design brings out the characteristics of target individuals, groups or entities (Wiegmann *et al*., 2007); in this case the entity was Kenya Breweries Limited.

3.2 Study Site

The study was done at Kenya Breweries Limited (KBL) situated in Ruaraka (point B), Nairobi County and 12 km northeast of Nairobi City Center (point A) along Thika highway (Figure 3.1)

Figure 3.1: Location map of KBL on Thika highway, A2 (Google Maps, 2016)

3.3 Study Population

The study population comprised both permanent employees and contractors working at the brewery. Currently, there are about 40 contracted companies with approximately 1,000 staff in charge of different work categories including Engineering & services, Manufacturing, Sales, Marketing and Logistics, Human resource (HR) and Security. There are about 400 permanent employees making a total of 1,400 workers. The contractor workforce forms about 71.4% of the company's total employees. These work forces are equally exposed to various occupational safety and health hazards.

3.4 Subject Selection

3.4.1 Inclusion Criteria

Permanent employees and contracted workers working at KBL within the selected clusters, willing to participate in the study and had worked for more than six months at the study site.

3.4.2 Exclusion Criteria

Visitors and students attached to the respective departments at KBL.

3.5 Sample Size Determination

Estimation of sample size in research using Krejcie and Morgan is a commonly employed method. Krejcie and Morgan (1970) used the following formula to determine sampling size:

$s = X^2NP(1-P) \div (d^2(N-1) + X^2P(1-P))$, where:-

s = required sample size.

X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size (1400 made up of 1000 contractor workers and 400 permanent employees).

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05).

For this study therefore:-

$$s = \frac{3.841 \times 1400 \times 0.5(1-0.5)}{0.05 \times 0.05(1400-1) + 3.841 \times 0.5(1-0.5)}$$

= 302 (Total number of respondents)

The study employed a simple arithmetic formula to calculate the proportionate sample sizes, thus $s_h = (N_h / N)\, n$, where s_h is the sample size for stratum h, N_h is the population size for stratum h, N is total population size, and n is total sample size. The results are shown in Table 3.1.

Table 3.1: Proportionate sampling methods (Sampling frame)

Department	KBL Staff TP(p)	SZ(s)	Contractor Staff TP(p)	SZ(s)
Manufacturing	208	45	330	71
Engineering & Services	66	14	100	22
Sales, Marketing & Logistics	106	23	330	71
HR & Security	20	4	240	52
Totals	400	**86**	1000	**216**

Key**:** TP- Total population per department, SZ- Calculated sample size per department

3.6 Sampling Method

Purposive sampling was used to group KBL departments into four based on their respective mandates. From each of these groupings or clusters namely; Manufacturing, Engineering, Sales and Human Resource, simple random sampling method was used to draw the study participants. In each cluster, participants were assigned numbers and those with odd numbers were selected to participate in the study. The study sampled the following number of employees per department using proportionate sample size calculation; Manufacturing; 45 KBL and 71 contractor staff, Engineering and Services; 14 KBL and 22 contractor staff, Sales Marketing and Logistics; 23 KBL and 71 contractor staff, HR and Security;4 KBL and 52 contractor staff; totaling to 302.

3.7 Data Collection Tools

3.7.1 Primary Data

Primary data was collected using semi structured questionnaires (Appendix A2) which were predesigned and pretested at Central Glass Industries Limited (a sister company of KBL) and interview guide (Appendix A3). These provided both qualitative and quantitative data. Observation (observation guide appendix A4) formed a key component of primary data collection where notes and photographs were taken after seeking permission from the relevant authorities/departmental heads.

3.7.2 Secondary Data

Secondary data was obtained from health records, incident & accident occurrence books from the safety office, general registers, various statutory audit and other safety and health reports at KBL.

3.8 Data Management

3.8.1 Data Storage

All research materials; hard copy questionnaires and other scripts were securely kept in a locker and confidentiality maintained before and after analysis. The analyzed data was stored in electronic devices, flash disks and files which were password encrypted to prevent unauthorized access. Protection from loss was done by backup in both internet and magnetic storage devices (flash disks and memory cards).

3.8.2 Data Analysis

Different types of qualitative data was gathered, transcribed, coded, and analyzed systematically. Various statistical data analysis methods were employed. These includes; calculating standard deviations and mean scores of responses from questionnaires to determine the occupational safety and health practices among the workers. Correlation coefficient was used to determine the associations between occupational safety and health practices and various aspects of performance e.g. number of accidents in different departments. Statistical Package for Social Scientists version 20 was used for analysis and significance were considered at 95% confidence interval.

3.9 Ethical Consideration

3.9.1 Authorization

Authorization was sought from Jomo Kenyatta University of Agriculture and Technology's institute of energy and environmental technology office (IEET). Permission to conduct the study at KBL was sought from the management (Appendix A1).The purpose of the proposed study was explained to the individual participants before signing the informed consent form, the first page of the questionnaire (Appendix A2).

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Participants Response Rate and Demographic Information

4.1.1 Response Rate

A total of 302(100%) employees from the Kenya Breweries Limited participated in this study (both KBL and contracted). The response was 100% meaning that the respondents were willing to participate in the study. Mugenda and Mugenda (1999) in their observation stated that a response rate of 50% is adequate for analysis and reporting while 100% response rate is excellent. Babbie (2007) in his study suggests that in research a response rate of at least 50% is considered adequate for analysis and reporting; a response of 60% is good; a response of 70% is very good; a response of 80% and above is excellent.

Among the participants, 116(38.4%) were drawn from the Manufacturing department, 94(31.1%) were from Sales, Marketing and Logistics department, 56(18.5%) were from Human Resource and Security department while the remaining 36(11.9%) were from Engineering and Services department (Figure 4.1). Majority of the participants were from manufacturing department supporting the fact that manufacturing is the core business of the company.

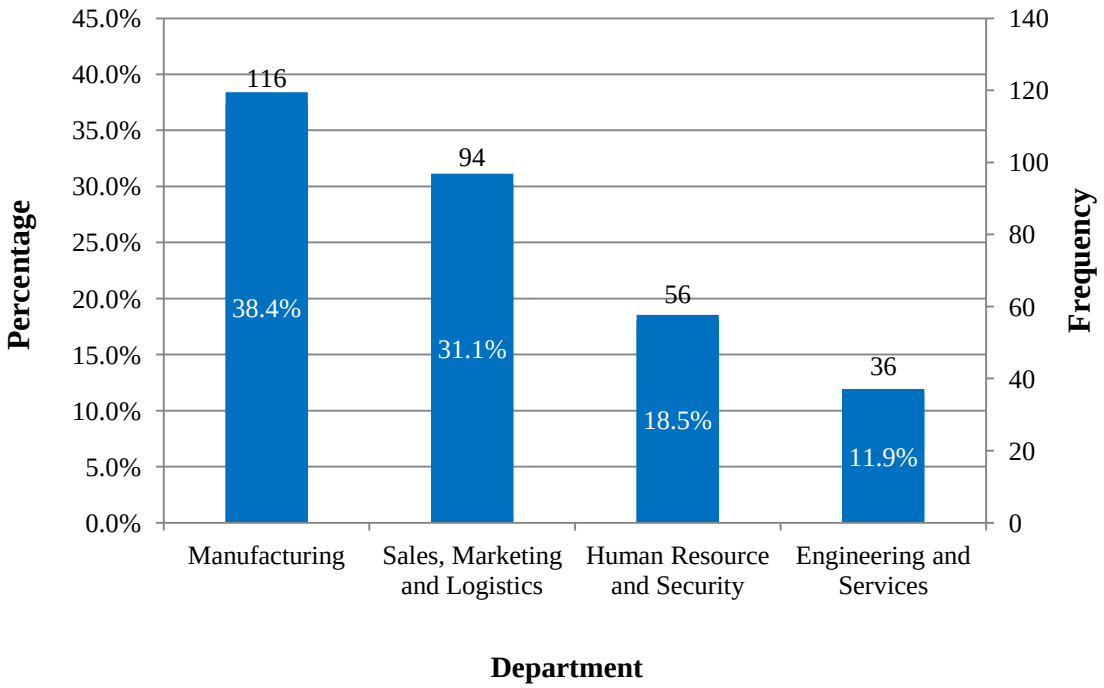


Figure 4.1: Participants response rate

4.1.2 Demographic Information of the Participants

Terms of employment were either permanent or contract among the participants in this study. A total of 249(82.5%) were employed on contract terms while 53(17.5%) were employed on permanent terms (Table 4.1). The participants who were on contract terms were employed through outsourcing of services from other companies. A number of researchers discuss services outsourcing from the Supply Chain Management point of view. Rao and Young (2003) suggest that firms consider outsourcing of logistics to an external logistics services provider when logistics complexity is high. Wilding and Juriado (2004) stated that cost reduction is the main motivation for logistics outsourcing. Rabinovic *et al.* (2009), mentions that firms which outsource for operational and cost-

based reasons, will tend to restrict the logistics service provider's involvement to the basic logistics functions.

Therefore, an outsourcing decision might be influenced by a firm's supply chain characteristics logistics complexity and demand uncertainty or logistics strategy.

In this study majority [229(75.8%)] of the workers were male while females were [73(24.2%)] as shown in Table 4.1. Male participants were more compared to their female counterparts. Work in manufacturing industry attracts more males than females because most of the work is manual and requires musculinity. A similar study by Kimeto (2015) on safety provision among tea factory workers reported that male workers in the factories were high (75.0%) compared to their female counterparts (25.0%). Hard work with high occupational risk is usually done by men according to Jeanne (2007) and WHO (2010). Men are known to take high risk in order to provide for their families especially during economic hard times hence the high number of men working in risky undertaking in the brewery as observed by this study. Kimeto (2015) in his study had similar observation regarding risk taking nature of men.

The study showed that 194(64.2%) participants were married, 70(23.2%) were single, 34(11.3%) were in a relationship that was not defined, while 4(1.3%) did not respond (Table 4.1). Majority of the workers were married, therefore emotionally mature and from an OSH perspective expected to be risk averse as a result of implied behavioral stability.

Among the participants, 126(41.7%) had up to college level of education, 87(28.8%) had up to university level of education, 83(27.5%) had up to secondary level of education while the remaining 6(2%) had up to primary level of education as their highest level of education attained (Table 4.1). In Kenya primary school and secondary school education is considered basic education. In this study 70.5% had college education and above. These categories of people normally seek for white color jobs and only take up blue

color jobs when the former is not forthcoming. When educated people take up jobs which are risky in nature, training on OSH becomes easy because they are trainable. Karwowski and Marras (1998) in their book "The Occupational Ergonomics Handbook" assert that education of workers in the construction industry is key in informing and training the construction crew of the necessary equipments, in addition this helps in selecting competent workforce.

A similar study done on street food vendors in Bangladeshi by Khairuzzaman *et al.* (2014) found that the level of education achieved by his participants was comparatively low hence does not concur with the results of this study. Education and experience is considered a human resource asset in any given organization. Training in OSH at KBL was found to be mostly conducted in English hence most workers were able to benefit from this training due to their literacy level.

Table 4.1: Demographic information of the participants

	Frequency (n)	Percent (%)	Valid Percent (%)	Cumulative Percent (%)
Engagement				
On Contract	249	82.5	82.5	82.5
Permanently Employed	53	17.5	17.5	100.0
Total	302	100.0	100.0	
Gender				
Male	229	75.8	75.8	75.8
Female	73	24.2	24.2	100.0
Total	302	100.0	100.0	
Marital status				
Married	194	64.2	65.1	65.1
Single	70	23.2	23.5	88.6
In a relationship	34	11.3	11.4	100.0
No Response	4	1.3		
Total	302	100.0	100.0	
Education level				
College	126	41.7	41.7	41.7
University	87	28.8	28.8	70.5
Secondary	83	27.5	27.5	98.0
Primary	6	2.0	2.0	100.0
Total	302	100.0	100.0	

4.1.3 Analysis of Respondents' Departments and Nature of Engagement

An analysis of the participants departments and their nature of engagement shows that, 85(73.3%) workers from the Manufacturing Department were employed on contract basis while 31(26.7%) were employed on permanent terms. Manufacturing department forms the bulk of employees since the core business of the brewery is to manufacture beverages. From the Sales, Marketing and Logistic Department, 80(85%) were employed on contract while 14(15%) were employed on permanent terms. Sales marketing and logistics is the second largest department in the brewery. From Human Resources and Security Department 52(92.9%) were employed on contract while 4(7.1%) were employed on permanent terms.

This study shows that majority of the workers were contractors from outsourced companies. Contractors were the majority in all departments. There was significant association ($p=0.01$) between terms of engagement and the department one comes from (Table 4.2). Wilding and Juriado (2004) in their study on customer perceptions on outsourcing decisions found that there was significant association between outsourcing of workers and the departments; hence concurs with this study.

Table 4.2: Analysis of respondents departments and nature of engagement

Department	Nature of engagement			
	Contractor (n) (%)	Permanent (n) (%)	Total (n) (%)	p-value
Manufacturing	85 (73.3)	31 (26.7)	116 (100.0)	0.01
Sales, Marketing and Logistics	80 (85.0)	14 (15.0)	94 (100.0)	
Human Resource and Security	52 (92.9)	4 (7.1)	56 (100.0)	
Engineering and Services	31 (86.1)	5 (13.9)	36 (100.0)	
Total	248 (82.4)	54 (17.6)	302 (100.0)	

4.1.4 Analysis of Respondents' Departments and Educational Level

In this study 2(3.6%) participants in the department of Human Resources & Security had up to primary level of education, 23(41.1%) had up to secondary level of education, 23(41.1%) had up to college level of education while 8(14.3%) had up to university level of education. Very few had primary educational and university educational level hence most had secondary and college education. There was significant association (p=0.00) between manufacturing department and workers educational level. The other departments and the employee education level had no significant associations (p=0.17, 0.55 and 0.09) as shown in Table 4.3. Sales and Marketing as well as Human Resource department are expected to employ workers with college and university education but that was not the case in this study. Also manufacturing department workers are expected to have educational level of secondary school and below but in this study majority had

college and University education. Those workers in the manufacturing departments with college and University education were supervisors, their assistants and head of departments. This group of staff is referred to as middle level management in manufacturing sector. Some general workers in this department had college and University education therefore it shows that due to high unemployment rate in Kenya, graduates from colleges and Universities are taking up manual work and other blue color jobs as a result. It also shows that manual work does not segregate on educational level.

Table 4.3: Analysis of respondents' department and education level

Department	**Level of Education**					
	Primary (n) (%)	Secondary (n) (%)	College (n) (%)	University (n) (%)	Total (n) (%)	p-value
Manufacturing (Spirits/Brewing/ Packaging/Quality)	1 (0.9)	28 (24.1)	44 (37.9)	43 (37.1)	117 (100.0)	0.00
Engineering & Services (incl. Finance & Procurement)	1 (2.8)	8 (22.2)	19 (52.8)	8 (22.2)	36 (100.0)	0.17
Sales, Marketing & Logistics	2 (2.2)	24 (25.8)	39 (41.9)	28 (30.1)	93 (100.0)	0.55
HR & Security	2 (3.6)	23 (41.1)	23 (41.1)	8 (14.3)	56 (100.0)	0.09

4.1.5 Work Experience and Number of Daily Working Hours per Week

In this study 138(45.7%) workers had a working experience of between 1-5 years, 96(31.8%) had a working experience of less than 1 year, 47(15.6%) had a working experience of between 6-10 years while 21(7%) had a working experience of more than 10 years in KBL. Those with one year and above five years' experience were few while those with work experience of between 1-5 years were majority. The findings of this study showed that, 234(78%) employees worked for 40 hours or more in a week, 51(17%) worked for between 20-39 hours in a week, 15(5%) worked for less than 20 hours per week while 2(0.7%) did not respond (Table 4.4).

Under the Regulation of Wages (General) order, subsidiary to the Regulations of Wages and Conditions of Employment Act, the general working hours are 52 per week, but the normal working hours usually consist of 45 hours of work per week, Monday to Friday 8 hours each, 5 hours on Saturday under the special Orders for different sectors subsidiary to the Regulations of Wages and Conditions of Employment Act 2007 Laws of Kenya. Collective agreements may modify the working hours, but generally provide for weekly working hours of 40 up to 52 hours per week. Munabi *et al.*, (2014) in their studies in low resource settings in Uganda found out that the average working hours per week was 43.7 hours. Working more than 12 hours at a time, have a significantly greater risk of bearing a work-related injury (Lockley *et al.*, 2007). Working long hours with little break time in between has negative mental effects. A study done by Beecroft *et al.*, (2008) found that workers who have control over their working hours experience more job satisfaction, while a study done by Akello (2013) showed that long working hours had a significant negative impact on mental well-being of workers. In this study majority [234(78%)] of the participant worked for 40 hours or more in a week hence they are prone to fatigue, job dissatisfaction and other negative consequences of working long hours as reported by earlier by previous studies.

Table 4.4: Employees work experience and working hours

	Frequency (n)	Percent (%)	Cumulative Percent (%)
No. of Years worked			
1-5 years	138	45.7	45.7
Less than 1 year	96	31.8	77.5
6-10 years	47	15.6	93.1
More than 10 years	21	7.0	100.0
Total	302	100.0	
Weekly working hours			
Hours worked per week			
40 hours/ week or more	234	77.5	78.0
20-39 hours/ week	51	16.9	95.0
Less than 20 hours/ week	15	5.0	100.0
No Response	2	0.7	
Total	302	100.0	

4.2 Awareness of OSH Hazards Faced by Workers at KBL.

4.2.1 Physical Hazards

In this study, 11(5.5%) participants disagreed that the risk of collision with moving vehicles was well managed, 6(3.0%) were uncertain while 183(91.5%) agreed that this hazard was well managed (Table 4.5). Majority (91.5%) confirmed that collision with moving vehicles was well managed at KBL. Collision of moving vehicle at the KBL was not a major problem since majority cited it has being well managed. Plate 4.1 shows clearly marked walk way for pedestrians segregated from other vehicular traffic.

Plate 4.1: A safe walkway with clear segregation from vehicular traffic

Six (5.1%) employees disagreed that work in confined spaces was well managed, 7(5.9%) were uncertain while 106(89%) agreed that this hazard was well managed (Table 4.5). Falling from height was identified as one of the physical hazards at the KBL. A few [4(2.5%)] participants disagreed that falls from height were well managed, 6(3.8%) were uncertain while 150(93.8%) agreed that this hazard was well managed (Table 4.5). Ten (4.7%) participants disagreed that slippery surfaces were well managed, 17(8.0%) were uncertain while 185(87.3%) agreed that this hazard was well managed (Table 4.5). There was visible signage warning on the presence of slippery services in the production section and in the office departments. Water is utilized in the manufacturing department and poses as a risk since it makes the floors slippery.

The study showed that, 7(5.3%) workers disagreed that dangerous electrical energy was well managed, 9(6.8%) were uncertain, while 116(87.9%) agreed that this hazard was well managed. The study showed that there were warnings on high voltage electricity which was one of the risk identified. Electricity is one of the common risk in any

manufacturing sector that utilizes high power voltage for production and KBL is not an exception.

On the issue of exposure of workers to hot surfaces, 9(7.0%) disagreed that exposure to hot surfaces was well managed, 7(5.5%) were uncertain while 112(87.5%) agreed that this hazard was well managed. Majority confirmed that exposure to hot surfaces was well managed at the KBL premises. Machines at the production departments produce heat which makes the work environment to be significantly hot. Of all the participants 9(7.9%) disagreed that exposure to steam was well managed, 4(3.5%) were uncertain while 101(88.6%) agreed that this hazard was well managed (Table 4.5). Most workers confirmed that steam exposure in this study was well managed hence was not a problem. Contact with hot water, steam lines and process equipment can result in serious burn injuries. Most burns occur on the hands, arms and face. Hot water used for clean-up or wash-down has also been known to cause burns on feet and legs. According to Muchemi (2012), heat sealers and glue operations on packaging lines also cause burns. Guarding of exposed hot points on equipment is important. Proper evaluation of the hazards, selection and use of personal protective equipment, will also help reduce or eliminate worker exposure to high temperatures and burns. Use of pipeline breaking and lockout procedures also protects workers from the unexpected release of hot liquids and steam (Duignan, 2003; Burns, 2006).

Among the participants, 10(5.2%) disagreed that excessive noise was well managed, 13(6.7%) were uncertain while 171(88.1%) agreed that this hazard was well managed (Table 4.5). Most workers agreed that noise prevention at the KBL was well in place. Noise conservation programs provide that in every workplace where noise exceeds 85dB (A), noise prevention measures as well as PPEs provision need to be in place. Bhatia *et al*, (1991) define noise pollution as unwanted electromagnetic signal that produces a jarring or displeasing effect and which interferes with human communication, comfort and health. The Kenyan law (Noise Prevention and Control Rules) stipulates that no

worker should be exposed to noise levels in excess of the continuous equivalent of 90 dB(A) in 8 hours, within any 24 hours duration period. Many other countries forbid an exposure above 85 dB for the same period. In addition to the negative OSH impact exposure to high noise levels lowers employee morale and productivity. The study observed that noise was not well managed especially in the manufacturing departments. All workers must be provided with ear musk when noise exceeds the recommended limits. Noise exposure time should be reduced when there are no noise protective devices yet a worker is required to attend his duties at work place with high noise levels. In this study although workers confirmed that noise was not a problem, there were lots of noise at the work shop as well as the manufacturing departments.

10(10.2%) workers disagreed that excessive vibrations were well managed, 6(6.1%) were uncertain while 82(83.7%) agreed that excessive vibrations were well managed. From the foregoing KBL appears to have adequate ways and means of managing vibrations as reported by the participants. Pressure was identified has one of the hazards in the KBL plant, 10(11.0%) workers disagreed that pressure extremes were well managed, 1(1.1%) were uncertain while 80(87.9%) agreed that this hazard was well managed. Majority confirmed that pressure as a hazard was well managed at the KBL. There was a significant association (p=0.00) between exposure to hot surfaces and the manufacturing department. The other hazards and the departments had no significant associations since their p-values were more than 0.05 (Table 4.5).

Table 4.5: Management of physical hazards at KBL

Physical hazards	Response	Department				df	χ^2	Sig.
		A (n) %	B (n) (%)	C (n) (%)	D (%)			
Collision with vehicles	Disagree	5 (6.8)	4 (5.8)	0 (0.0)	2 (7.7)	6	0.139	0.691
	Uncertain	3 (4.1)	2 (2.9)	0 (0.0)	1 (3.8)			
	Agree	65 (89.0)	63 (91.3)	32 (100.0)	23 (88.5)			
Confined space entry	Disagree	2 (3.9)	4 (12.1)	0 (0.0)	0 (0.0)	6	0.289	0.136
	Uncertain	1 (2.0)	3 (9.1)	3 (9.1)	0 (0.0)			
	Agree	48 (94.1)	26 (78.8)	10 (90.9)	22 (100.0)			
Falls from height	Disagree	2 (3.0)	2 (4.1)	0 (0.0)	0 (0.0)	6	0.142	0.779
	Uncertain	2 (3.0)	3 (6.1)	0 (0.0)	1 (3.2)			
	Agree	62 (93.9)	44 (89.8)	14 (100.0)	30 (96.8)			
Slippery surfaces	Disagree	7 (7.9)	2 (3.3)	0 (0.0)	1 (3.1)	6	0.189	0.274
	Uncertain	9 (10.1)	5 (8.2)	0 (0.0)	3 (9.4)			
	Agree	73 (82.0)	54 (88.5)	30 (100.0)	28 (87.5)			
Dangerous electrical energy	Disagree	1 (1.6)	5 (16.7)	0 (0.0)	1 (4.0)	6	0.335	0.021
	Uncertain	6 (9.7)	3 (10.0)	0 (0.0)	0 (0.0)			
	Agree	55 (88.7)	22 (73.3)	15 (100.0)	24 (96.0)			
Exposure to hot surfaces	Disagree	2 (3.0)	6 (27.3)	0 (0.0)	1 (4.0)	6	0.466	0.000
	Uncertain	3 (4.5)	4 (18.2)	0 (0.0)	0 (0.0)			
	Agree	62 (92.5)	12 (54.5)	14 (100.0)	24 (96.0)			
Exposure to steam	Disagree	3 (5.1)	5 (21.7)	0 (0.0)	1 (4.5)	6	0.335	0.047
	Uncertain	1 (1.7)	2 (8.7)	1 (10.0)	0 (0.0)			
	Agree	55 (93.2)	16 (69.6)	9 (90.0)	21 (95.5)			
Excessive noise	Disagree	3 (3.4)	6 (13.0)	0 (0.0)	1 (3.3)	6	0.24	0.084
	Uncertain	7 (8.0)	4 (8.7)	2 (6.7)	0 (0.0)			
	Agree	78 (88.6)	36 (78.3)	28 (93.3)	29 (96.7)			
Excessive vibrations	Disagree	4 (8.5)	5 (20.8)	0 (0.0)	1 (5.9)	6	0.293	0.208
	Uncertain	2 (4.3)	3 (12.5)	1 (10.0)	0 (0.0)			
	Agree	41 (87.2)	16 (66.7)	9 (90.0)	16 (94.1)			
Pressure extremes	Disagree	4 (8.7)	5 (25.0)	0 (0.0)	1 (6.3)	6	0.326	0.14
	Uncertain	0 (0.0)	1 (5.0)	0 (0.0)	0 (0.0)			
	Agree	42 (91.3)	14 (70.0)	9 (100.0)	15 (93.8)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.2.2 Mechanical Hazards

In this study 5(4.4%) workers disagreed that crushing hazards were well managed, 12(10.6%) were uncertain while 96(85.0%) agreed that this hazard was well managed (Table 4.6). Majority were affirmative that crushing hazards were well managed at the brewery. Machines are commonplace in many industries, including manufacturing, mining, construction and agriculture (HDO, 2012) and can be dangerous to workers. Many machines involve moving parts, sharp edges, hot surfaces and other hazards with the potential to crush, burn, cut, shear, stab or otherwise strike or wound workers if used unsafely. Various safety measures exist to minimize these hazards, including lock-out / tag-out procedures for machine maintenance and roll over protection systems for vehicles (NIOSH, 2012). According to the United States Bureau of Labor Statistics, machine-related injuries were responsible for 64,170 cases that required days away from work in 2008. More than a quarter of these cases required more than 31 days spent away from work. That same year, machines were the primary or secondary source of over 600 work-related fatalities (Harris *et al.*, 2012). Machines are also often involved indirectly in worker deaths and injuries, such as in cases in which a worker slips and falls, possibly upon a sharp or pointed object. The transportation sector bears many risks for the health of commercial drivers, too, for example from vibration, long periods of sitting, work stress and exhaustion.

During handling, glass bottles sometimes break and resultant cullet poses risk of glass cuts to the workers. The results showed that, 2(1.4%) workers disagreed that cullet as a hazard was well managed, 10(6.8%) were uncertain while 134(91.8%) agreed that this hazard was well managed (Table 4.6). Statistics show that there was no significant association (p=0.159) between cutting hazards and any department in this study. This study identified grinding as one of the mechanical hazards. Regarding this hazard, 7(6.0%) workers disagreed that grinding was well managed, 6(5.1%) were uncertain while 104(88.9%) agreed that this hazard was well managed. Grinding as a hazard was

present in the work shop department and it was well managed by the company. Statistics shows that there was no association (p=0.291) between this hazard and any particular department.

Among the participants, 5(6.5%) workers disagreed that entanglement hazards were well managed, 10(13.0%) were uncertain about this issue while 62(80.5%) agreed that this hazard was well managed. Majority confirmed that this hazard was well managed. There was no significant association (p=0.322) between this hazard and any particular department one comes from in this study. The results showed that, 6(6.9%) workers disagreed that frictions and abrasions were well managed, 5(5.7%) were uncertain about this issue while 76(87.4%) agreed that this hazard was well managed. Frictions and abrasions were present in the manufacturing and logistics department. Pallets and crates were pulled/hauled hence causing frictions leading to abrasions to the workers. There was no significant association (p=0.24) between this hazard and the department one came from (p>0.05). Regarding impact as a hazard, 3(3.5%) workers disagreed that impaction hazards were well managed, 10(11.6%) were uncertain about this issue while 73(84.9%) agreed that impact as a mechanical hazard was well managed. Workers sometime can come into contact with vehicular traffic such as trucks and forklifts. This can lead to serious collision which sometimes can be fatal. There was no significant association (p=0.685) between impacts as a hazards and the department of origin (Table 4.6).

Table 4.6: Association between mechanical hazards and workers department

Mechanical hazards		Department				df	χ^2	Sig.
	Response	A (n) (%)	B (n) (%)	C (n) (%)	D			
Crushing	Disagree	2 (4.0)	2 (6.5)	0 (0.0)	1 (6.7)	6	0.212	0.532
	Uncertain	6 (12.0)	3 (9.7)	0 (0.0)	3 (20.0)			
	Agree	42 (84.0)	26 (83.9)	17 (100.0)	11 (73.3)			
Cutting	Disagree	1 (1.5)	1 (2.9)	0 (0.0)	0 (0.0)	6	0.159	0.719
	Uncertain	6 (9.1)	3 (8.6)	0 (0.0)	1 (3.4)			
	Agree	59 (89.4)	31 (88.6)	16 (100.0)	28 (96.6)			
Grinding	Disagree	1 (2.0)	4 (15.4)	0 (0.0)	2 (7.1)	6	0.291	0.129
	Uncertain	4 (8.0)	2 (7.7)	0 (0.0)	0 (0.0)			
	Agree	45 (90.0)	20 (76.9)	13 (100.0)	26 (92.9)			
Entanglement	Disagree	2 (4.3)	2 (14.3)	1 (20.0)	0 (0.0)	6	0.322	0.241
	Uncertain	4 (8.7)	3 (21.4)	0 (0.0)	3 (25.0)			
	Agree	40 (87.0)	9 (64.3)	4 (80.0)	9 (75.0)			
Friction and abrasion	Disagree	2 (5.0)	3 (15.8)	0 (0.0)	1 (5.3)	6	0.24	0.542
	Uncertain	2 (5.0)	2 (10.5)	0 (0.0)	1 (5.3)			
	Agree	36 (90.0)	14 (73.7)	9 (100.0)	17 (89.5)			
Impact	Disagree	1 (2.3)	2 (8.3)	0 (0.0)	0 (0.0)	6	0.214	0.685
	Uncertain	6 (13.6)	2 (8.3)	0 (0.0)	2 (16.7)			
	Agree	37 (84.1)	20 (83.3)	6 (100.0)	10 (83.3)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.2.3 Biological Hazards

In this study microorganisms exposure was identified as one of the biological hazards. Among the participants, 7(6.5%) workers disagreed that microorganisms were well managed, 15(13.9%) were uncertain about this issue while 86(79.6%) agreed that this hazard was well managed (Table 4.7). Majority cited that these types of hazards were well managed. Biological hazards in a brewery can be caused by yeast, bacteria and fungi spores. Sometimes workers can pass biological agents from one person to another through contact or inhalation. For example when a worker is suffering from common cold or tuberculosis, he or she can pass it through coughing. Pryor and Capra (2012) in their book on OSH hazards noted that biohazards present the Occupational Health and Safety (OHS) professional with complex challenges. Many and varied biohazards may result from workplace exposure to organisms, or substances produced by organisms, that threaten human health. Although workers in health and community care, and agricultural and fishing occupations are at particular risk of exposure to hazardous biological agents, all workplaces including breweries harbor the potential for various forms of biohazard exposure, including person-to-person transmission of infectious disease. While prevention and management of biohazards is often the responsibility of occupational or public health personnel, the generalist OHS professional should have an understanding of biohazards and their mechanisms of action, and the importance of vigilance and standard control measures.

A total of 6(8.1%) workers disagreed that exposure to pathogens were well managed, 16(21.6%) were uncertain while 52(70.3%) agreed that this hazard was well managed (Table 4.7). Any response above 60.0% is considered adequate hence this hazard is considered to be well managed. Crespigny (2011) in a similar study on biological hazards identified a dearth of Australian policy interventions relevant to biological hazards; the general duty under section 19 of the national model Work Health and Safety Act (WHSA) requires a person conducting a business to ensure, so far as is reasonably

practicable, the health and safety of workers and others who may be put at risk by the conduct of the business or undertaking (Safe Work Australia, 2011). This duty applies to all hazards including biohazards. In Kenya the OSHA (2007) requires the occupier to provide a safe working environment to the workers.

Pests and insects were also identified has biological hazards. Among the workers, 17(17.0%) disagreed that dangerous pests and insects were well managed, 11(11.0%) were uncertain while 72(72.0%) agreed that this hazard was well managed. Insects like weevils, mosquitoes, flies among others are found in a brewing industry. Weevils eat grains such as barley and sorghum which are used for brewing. Pests include rats and mice which enter the brewery to scavenge for grains and brew residues. The chi square test showed that there was no significant association ($p=0.873$, 0.196 and 0.849) between any particular department and the biological hazard in question (Table 4.7). Pryor and Capra (2012) in their book on OSH hazards noted that biological hazards include insects, pests and their bi-products that are harmful to both human beings and the environment.

Table 4.7: Association between biological hazards and workers departments

Biological hazards		Department				df	χ^2	Sig.
	Response	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)			
Micro organisms	Disagree	4 (7.1)	1 (4.2)	1 (6.7)	1 (7.7)	6	0.151	0.873
	Uncertain	10 (17.9)	2 (8.3)	1 (6.7)	2 (15.4)			
	Agree	42 (75.0)	21 (87.5)	13 (86.7)	10 (76.9)			
	Total	56 (100.0)	24 (100.0)	15 (100.0)	13 (100.0)			
Exposure to pathogens	Disagree	1 (2.8)	3 (15.8)	2 (20.0)	0 (0.0)	6	0.341	0.196
	Uncertain	8 (22.2)	3 (15.8)	1 (10.0)	4 (44.4)			
	Agree	27 (75.0)	13 (68.4)	7 (70.0)	5 (55.6)			
	Total	36 (100.0)	19 (100.0)	10 (100.0)	9 (100.0)			
Dangerous pests and insects	Disagree	9 (19.1)	4 (17.4)	3 (20.0)	1 (6.7)	6	0.163	0.849
	Uncertain	5 (10.6)	2 (8.7)	1 (6.7)	3 (20.0)			
	Agree	33 (70.2)	17 (73.9)	11 (73.3)	11 (73.3)			
	Total	47 (100.0)	23 (100.0)	15 (100.0)	15 (100.0)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.2.4 Chemical Hazards

In this study 4(2.6%) participants disagreed that hazards associated with handling of chemicals were well managed, 11(7.1%) were uncertain while 141(90.4%) agreed chemical hazards were well managed (Table 4.8). In a brewery chemicals include; detergent soaps, disinfectants, water treatment products, refrigerants, reagents, fossil fuels and lubricants. Cleaners, engineering, production and laboratory workers are exposed to this hazard. Exposure to dangerous fumes emitted by the aforementioned chemicals was also identified as a chemical hazard where 7(5.5%) participants disagreed that exposure to fumes was well managed, 18(14.1%) were uncertain while 103(80.5%)

agreed. Most workers indicated that fume hazards were well managed in their work stations. Miguel *et al.,* (2007) found that the brewing industry uses different types of disinfectants such as: hydrogen peroxide, halogens or halogenated carbonic acids, alkylamines, biguanides, chlorine dioxide. These chemicals and their fumes have unhealthy effects on workers exposed to them. In one of the reports of the Nigerian Institute of Safety Professionals (NISP), over 11,000 people die from occupational accidents each year and a worker is injured every 18 seconds in chemical industries in Nigeria. In this study chemical hazards are well managed and no major accident has been reported as a result of chemical hazards at KBL.

Four [4(4.1%)] workers disagreed that smoke hazard was well managed, 15(15.3%) were uncertain while 79(80.6%) agreed that exposure to smoke hazards was well managed. Many workers confirmed that they were exposed to smoke and the exposures were well managed at KBL. 3(3.7%) workers disagreed that exposure to fossil fuels were well managed, 9(11.1%) were uncertain while 69(85.2%) agreed that this hazard was well managed. There was no significant association between any department the workers comes from and any chemical hazard (Table 4.8).

Table 4.8: Association of chemical hazards and workers department

Chemical hazards		Department				df	χ^2	Sig
	Response	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)			
Handling of chemicals	Disagree	1 (1.1)	1 (4.2)	0 (0.0)	2 (7.4)	6	0.189	0.47
	Uncertain	7 (8.0)	2 (8.3)	0 (0.0)	2 (7.4)			
	Agree	79 (90.8)	21 (87.5)	18 (100.0)	23 (85.2)			
	Total	87 (100.0)	24 (100.0)	18 (100.0)	27 (100.0)			
Exposure to fumes	Disagree	2 (3.6)	2 (6.9)	1 (6.3)	2 (7.4)	6	0.148	0.833
	Uncertain	8 (14.3)	6 (20.7)	1 (6.3)	3 (11.1)			
	Agree	46 (82.1)	21 (72.4)	14 (87.5)	22 (81.5)			
	Total	56 (100.0)	29 (100.0)	16 (100.0)	27 (100.0)			
Exposure to smoke	Disagree	2 (6.9)	1 (3.1)	0 (0.0)	1 (5.6)	6	0.194	0.718
	Uncertain	5 (17.2)	6 (18.8)	1 (5.3)	3 (16.7)			
	Agree	22 (75.9)	25 (78.1)	18 (94.7)	14 (77.8)			
	Total	29 (100.0)	32 (100.0)	19 (100.0)	18 (100.0)			
Exposure to fossil fuels	Disagree	1 (3.0)	1 (5.3)	0 (0.0)	1 (5.9)	6	0.193	0.805
	Uncertain	5 (15.2)	2 (10.5)	0 (0.0)	2 (11.8)			
	Agree	27 (81.8)	16 (84.2)	12 (100.0)	14 (82.4)			
	Total	33 (100.0)	19 (100.0)	12 (100.0)	17 (100.0)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.2.5 Ergonomic Hazards

The study showed that, 20(19.6%) participants disagreed that poor workstation design was well managed, 22(21.6%) were uncertain while 60(58.8%) agreed that this hazard was well managed (Table 4.9). The study observed that all the work stations were fairly designed and the comfort of the workers was considered. There was no significant association (p=0.39) between this hazard and any particular department an employee comes from. Among the workers, 17(21.3%) disagreed that unnatural posture/motions was well managed, 12(15.0%) were uncertain while 51(63.8%) agreed unnatural posture/motions hazard was well managed. Workstations in all the departments studied were designed differently to suite the workers. More than 50.0% confirmed that these hazards were well managed. Pearson chi square test showed that there was no significant association (χ^2 = 0.131, df=6, p=0.967) between this hazard and any particular department a worker comes from.

Inadequate lighting at the KBL departments was identified as one of the ergonomic hazards. A total of 18(20.7%) participants disagreed that inadequate lighting was well managed, 8(9.2%) were uncertain while 61(70.1%) agreed that this hazard was well managed (Table 4.9). The study observed that all departments were fairly well lit. Majority of the participants confirmed that there was enough lighting and any hazard regarding lighting was well managed. 18(20.5%) participants disagreed that poor ventilation was well managed, 13(14.8%) were uncertain about this issue while 57(64.8%) agreed that this hazard was well managed. Most workers confirmed that ventilation hazards were well managed in this study. There was no significant association (χ^2 ¯0.264, df 6, p-0.418, χ^2 ¯0.212, df 6, p-0.683) between these ergonomic hazards and any particular department a worker came from (Table 4.9).

Table 4.9: Association of ergonomic hazards and workers department

Ergonomic hazards		Department				df	χ^2	Sig
	Response	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)			
Poor workstation design	Disagree	6 (15.0)	7 (20.6)	4 (30.8)	3 (20.0)	6	0.249	0.39
	Uncertain	8 (20.0)	10 (29.4)	0 (0.0)	4 (26.7)			
	Agree	26 (65.0)	17 (50.0)	9 (69.2)	8 (53.3)			
	Total	40 (100.0)	34 (100.0)	13 (100.0)	15 (100.0)			
Unnatural posture/ motions	Disagree	9 (25.7)	5 (20.0)	1 (11.1)	2 (18.2)	6	0.131	0.967
	Uncertain	5 (14.3)	4 (16.0)	1 (11.1)	2 (18.2)			
	Agree	21 (60.0)	16 (64.0)	7 (77.8)	7 (63.6)			
	Total	35 (100.0)	25 (100.0)	9 (100.0)	11 (100.0)			
Inadequate lighting	Disagree	5 (13.5)	9 (34.6)	1 (9.1)	3 (23.1)	6	0.264	0.418
	Uncertain	3 (8.1)	2 (7.7)	1 (9.1)	2 (15.4)			
	Agree	29 (78.4)	15 (57.7)	9 (81.8)	8 (61.5)			
	Total	37 (100.0)	26 (100.0)	11 (100.0)	13 (100.0)			
Poor ventilation	Disagree	5 (14.7)	8 (28.6)	2 (22.2)	3 (17.6)	6	0.212	0.683
	Uncertain	4 (11.4)	3 (10.7)	2 (22.2)	4 (23.5)			
	Agree	25 (73.5)	17 (60.7)	5 (55.6)	10 (58.8)			
	Total	34 (100.0)	28 (100.0)	9 (100.0)	17 (100.0)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.2.6 Psychological Hazards

The results showed that, 11(18.6%) workers disagreed that issues of gender harassment were well managed, 10(16.9%) were uncertain about this issue while 38(64.4%) agreed that this hazard was well managed (Table 4.10). Employers in most countries have an obligation not only to protect the physical health of their employees but also the psychological health. Therefore as part of a risk management framework psychological or psychosocial hazards (risk factors) need to be identified and controlled in the workplace. According to EU-OSHA (2007) psychosocial hazards are related to the way work is designed, organized and managed, as well as the economic and social contexts of work and are associated with psychiatric, psychological and/or physical injury or illness. Linked to psychosocial risks are issues such as occupational stress and workplace violence which are recognized internationally as major challenges to occupational health and safety. In this study, 34(23.0%) participants disagreed that excessive work pressure was well managed, 24(16.2%) were uncertain while 90(60.8%) agreed that this hazard was well managed. Majority confirmed that these hazards were well managed.

On the issue of lone working, 19(23.2%) participants disagreed that lone working was well managed, 10(12.2%) were uncertain while 53(64.6%) agreed that this hazard was well managed. Lone working is when workers are assigned jobs which they do alone. The study observed that no worker was working alone but instead they worked as a team in almost all the departments. There was no significant association between psychological hazards and any department a worker comes from as shown in Table 4.10.

Table 4.10: Association between psychological hazards and workers department

Psychological hazards		Department				df	χ^2	Sig
	Response	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)			
Gender	Disagree	5 (17.9)	3 (16.7)	0 (0.0)	3 (27.3)	6	0.263	0.665
harassment	Uncertain	3 (10.7)	5 (27.8)	0 (0.0)	2 (18.2)			
	Agree	20 (71.4)	10 (55.6)	2 (100.0)	6 (54.5)			
	Total	28 (100.0)	18 (100.0)	2 (100.0)	11 (100.0)			
Excessive	Disagree	10 (16.7)	16 (32.7)	5 (22.7)	3 (17.6)	6	0.317	0.021
work	Uncertain	14 (23.3)	3 (6.1)	1 (4.5)	6 (35.3)			
pressure	Agree	36 (60.0)	30 (61.2)	16 (72.7)	8 (47.1)			
	Total	60 (100.0)	49 (100.0)	22 (100.0)	17 (100.0)			
Lone	Disagree	8 (20.5)	6 (30.0)	5 (33.3)	0 (0.0)	6	0.283	0.363
working	Uncertain	6 (15.4)	2 (10.0)	0 (0.0)	2 (25.0)			
	Agree	25 (64.1)	12 (60.0)	10 (66.7)	6 (75.0)			
	Total	39 (100.0)	20 (100.0)	15 (100.0)	8 (100.0)			

Key: A-Manufacturing, B-Sales, Marketing and Logistics, C-Human Resource and Security, D-Engineering and Services, χ^2-Chi-square Value, n-frequency, %-percentage

4.3 Characteristics of OSH Management System at KBL

4.3.1 Awareness of OSH Management Programs by Employees

In this study, one (0.3%) participant strongly disagreed that KBL as a company had adequate OSH policies, 3(1%) disagreed, 7(2.7%) were uncertain, 144(48.3%) agreed while 143(48%) strongly agreed (Table 4.11). Majority (96%) confirmed that the company had adequate OSH policies in place. According to the Directorate of Occupational Safety and Health Services, all workplaces are required to comply with OSHA 2007 and other standard practices as per the government rules and regulations.

Control of major accident hazards requires a specific focus on process-safety management over and above conventional safety management. Anderson (2004) expressed concern at the implications for management of major hazards and the extension of the "safety culture" concept to justify behavioral safety initiatives to reduce injury (or lost-time accident) rates.

According to the response of the participants, 1(0.3%) worker strongly disagreed that they understood the company's OSH policies, 9(3%) disagreed, 37(12.3%) were uncertain about the issue, 160(53.2%) agreed while 94(31.2%) strongly agreed with statement (Table 4.11). Majority (84.4%) confirmed that they understood the companies OSH policies in this study. Those who disagreed were either ignorant or they were genuine that they did not understand the OSH policies. According to a study by Garcia *et al.* (2004), workers' perceptions and experience in relation to occupational health and safety are scarcely considered in programs for the prevention of work related injuries and diseases, but in the current study workers perceptions and experience in relation to occupational health was adequate.

Healthy environments and healthy behaviors are key determinants of occupational health. Cohen *et al.* (2013) in their studies found out that interventions over workers' behavior intended to risk prevention are usually based on specific training programs and policies within the company. These programs are generally devoted to increasing workers' knowledge of job hazards and promoting safer work behaviors. Lindell (2009) in his study reported that organizational factors related to safety and health at work, including management's policies and practices regarding occupational risk prevention, affect implementation of workers' safety training. One of the policies could be noise prevention programs. The hearing conservation program provides that in every workplace where noise exceeds 85dB (A), then noise prevention measures as well as PPEs provision are some of the mandatory requirements according to NIOSH (2012).

Concerning KBL safety information, 1(0.3%) worker strongly disagreed that at KBL safety information was visible to all staff, 6(2.0%) disagreed, 12(4.0%) were uncertain, 116(38.5%) agreed while 166(55.1%) strongly agreed that at KBL safety information was visible to all staff (Table 4.11). Majority (93.6%) confirmed that safety information was visible to all staff at KBL. The rest either disagreed or were uncertain. The study observed a lot of safety information was displayed in the brewery's notice boards, main entrances and strategically placed within production areas for all the workers to read and familiarize themselves (Plate 4.2, 4.3 and 4.4). This is in line with the requirements of (OSHA. 2007).

Plate 4.2: Safety sign indicating mandatory PPE at the factory entrance

Plate 4.3: Safety warning signage at the spirits department

Plate 4.4: Safety notice board with OSH information displayed strategically

On hazard awareness, 4(1.3%) workers in the study disagreed that they were aware of occupational hazards in their respective workplaces, 16(5.3%) were uncertain, 132(43.7%) agreed while 150(49.7%) strongly agreed that workers were aware of hazards in the work place (Table 4.11). Most (93.4%) workers were aware of occupational hazards in their respective workplaces. The rest were either ignorant or they were not genuinely aware. Cohen *et al.* (2013) in their studies found out that interventions over workers' behavior intended to risk prevention are usually based on specific training programs. These programs are generally devoted to increasing workers' knowledge of job hazards and promoting safer work behavior within the work place.

Regarding the workers involvement in risk assessment, 13(4.3%) participants strongly disagreed that they were involved in risk assessment in their work areas, 38(12.6%) disagreed, 28(9.3%) were uncertain, 123(40.9%) agreed while 99(32.9%) strongly agreed that they were involved in risk assessment in their work areas (Table 4.11). Most (73.8%) workers in this study were involved in risk assessment. It is very important to involve workers on risk assessment in a workplace because in doing so workers will understand the elements of risks in their activities as well as the recommended mitigations.

Among the participants, 2(0.7%) strongly disagreed that safety operating procedures were available to all workers, 10(3.3%) disagreed, 27(9.0%) were uncertain, 132(43.9%) agreed while 130(43.2%) strongly agreed that safety operating procedures were available to all workers in their departments (Table 4.11). Majority (87.1%) of the workers confirmed that safety operating procedures were available to all. In this study 11(3.7%) workers strongly disagreed that adequate personal protective equipment was provided to all employees, 16(5.4%) disagreed, 24(8.1%) were uncertain, 123(41.3%) agreed while 124(41.6%) strongly agreed that adequate personal protective equipment was provided to all employees (Table 4.11). Most workers (82.9%) confirmed that there was adequate personal protective equipment that was provided to them by the company

and the study collaborates this information based on visual observation. The OSHA (2007) stipulates that it is the responsibility of the employer to provide a safe working environment to the workers including the provision of proper and working PPE's. A similar study conducted in Vishakapatnam steel plant of India showed that 27.5% of the workers were provided with PPE (Ziauddin, 2006). A study carried in a sample of 501 male printing workers from 28 factories in Hong Kong showed that 22.05% of workers were provided with PPE (Yu, 2005). Another study among dyes printing workers found that 34% of the workers were using PPE (Paramasivam *et al.*, 2010). The results of these other studies do not concur with the current study on PPE provision since PPE provision and utilization was over 82.9% while these other studies were below 50%.

Similarly, 4(1.3%) workers strongly disagreed that safety and health induction trainings were mandatory for all staff, 2(0.7%) disagreed, 8(2.7%) were uncertain, 85(28.3%) agreed while 201(67.0%) strongly agreed that safety and health induction trainings were mandatory for all staff (Table 4.11). Most (95.3%) workers confirmed that safety and health induction trainings were mandatory for all staff. These training are very important in any industry as well as any new work environment. They provide guidelines on the overall work environment including high risk activities and areas expected to be risky. In this study, 10(3.3%) workers strongly disagreed that all staff received refresher occupational safety and health training, 24(8.0%) disagreed, 49(16.3%) were uncertain, 126(42.0%) agreed while 91(30.3%) strongly agreed (Table 4.11). Majority (72.3%) confirmed that all staff received refresher occupational safety and health training. Refresher training is very important in a manufacturing industry like KBL which engages in various hazardous activities.

Any industry which involves high risk activities like manufacturing industry should promote a proactive safety culture. Safety culture involves the way safety is managed in a workplace and often reflects "the attitudes, beliefs, perceptions and values that employees share in relation to safety" (Cox & Cox, 1991). The U.K. Health and Safety

Commission developed one of the most commonly used definitions of safety culture: "The product of individual and group values, attitudes, perceptions, competencies and patterns of behavior that determine the commitment to and the style and proficiency of, an organization's health and safety management" (Flin *et al.*, 2000). "Organizations with a positive safety culture are characterized by communications founded on mutual trust, by shared perceptions of the importance of safety and by confidence in the efficacy of preventive measures." In Kenya and other countries where most of the manufacturers are chasing after profit, safety is always compromised. Employees are most often than not employed as casual workers hence it is very difficult to entrench safety cultures and other forms of safety training.

Table 4.11: Organizational OSH characteristics and policies at KBL

Awareness and preventive measures			Response		df	X^2	Sig.
A (n) (%)	**B (n) (%)**	**C (n) (%)**	**D (n) (%)**	**E (n) (%)**			
KBL as a company has adequate OSH policies					4	0.137	0.235
1 (0.3)	3 (1.0)	7 (2.7)	144 (48.3)	143 (48.0)			
Employees understand the company's OSH policies					4	0.059	0.903
1 (0.3)	9 (3.0)	37 (12.3)	160 (53.2)	94 (31.2)			
At KBL safety information is visible to all staff					4	0.118	0.376
1 (0.3)	6 (2.0)	12 (4.0)	116 (38.5)	166 (55.1)			
I am aware of OSH hazards in my workplace					3	0.088	0.501
0 (0.0)	4 (1.3)	16 (5.3)	132 (43.7)	150 (49.7)			
I am involved in risk assessment in my work area					4	0.125	0.315
13 (4.3)	38 (12.6)	28 (9.3)	123 (40.9)	99 (32.9)			
Safety operating procedures are available to all workers					4	0.087	0.686
2 (0.7)	10 (3.3)	27 (9.0)	132 (43.9)	130 (43.2)			
Adequate personal protective equipment is provided to all employees					4	0.097	0.589
11 (3.7)	16 (5.4)	24 (8.1)	123 (41.3)	124 (41.6)			
Safety and health induction training is mandatory for all staff					4	0.097	0.589
4 (1.3)	2 (0.7)	8 (2.7)	85 (28.3)	201 (67.0)			
All staff receive refresher occupational safety & health training					4	0.108	0.476
10 (3.3)	24 (8.0)	49 (16.3)	126 (42.0)	91 (30.3)			

Key: A-Strongly Disagree, B-Disagree, C-Uncertain, D-Agree, E-Strongly Agree

4.3.2 Awareness of OSH Training, First Aid and other OSH Activities

Regarding availability of trained first aiders in the work place, 8(2.7%) workers strongly disagreed that the factory had adequate number of trained first aiders, 16(5.4%) disagreed, 35(11.7%) were uncertain, 142(47.5%) agreed while 98(32.8%) strongly agreed (Table 4.12). An overwhelming majority (80.3%) confirmed the presence of trained first aiders in their work place. The presence of trained first aiders is very important in a manufacturing industry especially a commercial brewery like KBL because of the many risks involved. The work of a first aider is to provide the initial medical care during accidents before visiting a medical facility.

Adebiyi *et al.* (2006) in his study described an accident as an unplanned, unexpected and un-designed (not purposefully caused) event which occurs suddenly thereby causing injury or loss, a decrease in value of the resources, or an increase in liabilities. When they occur, it is very important to have first aiders at the manufacturing sites so that they can reduce workers pain and suffering by providing initial medical care. Virtually, every day and in every human endeavor, accidents have become a regular feature hence the need to have stand by first aiders in every work place. Accidents occur in human endeavors such as transport, homes and manufacturing organizations among several others. They most often occur as a result of unsafe conditions of work (Adebiyi *et al.*, 2006; WHO, 2007).

In this study 4(1.3%) workers strongly disagreed that they were aware of accident reporting procedures, 13(4.3%) disagreed, 32(10.6%) were uncertain, 149(49.5%) agreed while 103(34.2%) strongly agreed. Most (83.7%) of the participants affirmed that they were aware of accident reporting procedures. Accidents and incidents are supposed to be reported to either a first aider or safety representative in the work place. If they are minor the casualty is managed by the first aider and discharged. If the accident is major, then the worker is referred to a medical facility for specialized further management. The incidents and accidents are then recorded in the occurrence books for future reference.

Among the participants, 32(11.0%) workers strongly disagreed that they gave input in the design and layout of new equipment, 52(17.8%) disagreed, 58(19.9%) were uncertain, 95(32.5%) agreed while 55(18.8%) strongly agreed that they gave input in the design and layout of new equipment (Table 4.12). About 51.3% of the workers confirmed that they gave input in the design and layout of new equipment; the rest were either uncertain or did not agree with this statement about their work place. OSHA (2007) states that the occupier must involve all workers in decisions that affect their occupational safety and health in a work environment.

The results showed that, 26(8.7%) workers strongly disagreed that they participated in regular OSH committee meetings and workplace inspections, 58(19.5%) disagreed, 47(15.8%) were uncertain, 105(35.2%) agreed while 62(20.8%) strongly agreed. More than half of the participants confirmed that they are allowed to participate in regular OSH committee meetings and workplace inspections. According to OSHA (2007) workers are supposed to be allowed to participate in regular OSH committee meetings and to discuss their safety in the industry freely.

In this study 2(0.7%) workers strongly disagreed that dangerous parts of work equipment were adequately guarded, 17(5.7%) disagreed, 19(6.4%) were uncertain, 151(50.5%) agreed while 110(36.8%) strongly agreed with statement that dangerous parts of work equipment were adequately guarded (Table 4.12). About 87.3% of the participants stated that dangerous parts of work equipment were adequately guarded at the manufacturing industry. This shows that the KBL has not guarded their equipment 100% and there is still some work to be done in terms of occupational health and safety of the workers regarding machine guarding. When machines are not properly guarded then they become potential causes of serious accidents.

Regarding workroom ventilation, 10(3.3%) workers strongly disagreed that all workrooms were adequately ventilated, 20(6.7%) disagreed, 31(10.3%) were uncertain, 145(48.3%) agreed while 94(31.3%) strongly agreed. A majority of the workers (79.6%)

assessed their respective workrooms to be adequately ventilated. On work place lighting, 3(1.0%) workers strongly disagreed that their work stations were always adequately lit, 19(6.3%) disagreed, 13(4.3%) were uncertain, 150(50.0%) agreed while 115(38.3%) strong agreed (Table 4.12). Majority (88.3%) confirmed that their work place had proper lighting at all times. Ventilation is concerned with provision of fresh air in the workplace. The air in a brewery may contain several microorganisms such as fungi and bacteria spores. The amount and types of microorganisms present in the air can be affected by environmental factors such as humidity, temperature and air speed (Crozier-Dodson & Fung, 2002). Doesken *et al.* (2003) in a similar study observed that higher relative humidity is conducive to microbial growth and survival. On general observation, the researcher found no workstations with no adverse concerns regarding ventilation and lighting. 7(2.3%) workers strongly disagreed that their workroom temperatures were comfortable, 31(10.3%) disagreed, 15(5.0%) were uncertain, 151(50.0%) agreed while 98(32.5%) strongly agreed. Most workers (82.5%) confirmed that their workroom temperatures were comfortable. The management of the breweries has provided air conditioning where the temperatures would otherwise be extremely hot. A similar study by Shale and Lues, (2007) noted that in warm climates as compared to cold climates, the levels of indoor airborne microorganisms have been found to be higher, which indicates the effect of temperature. High temperature and sufficient light in a manufacturing industry reduces the amount of airborne microorganisms.

Among the participants 2(0.7%) workers strongly disagreed that their respective management understand safety and health issues in their respective working areas, 6(2.0%) disagreed, 20(6.6%) were uncertain, 144(47.8%) agreed while 129(42.9%) strongly agreed (Table 4.12). The study found that 90.7% of the workers agreed that their management understand safety and health issues in their respective working areas. There was no significant association ($p>0.05$) between awareness of OSH among the participants and any response given (Table 4.12)

Table 4.12: Awareness of activities constituting OSH at KBL

OSH activities awareness	Response				df	χ^2	Sig.
A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)	E (n) (%)			
The factory has adequate number of trained first aiders					4	0.093	0.632
8 (2.7)	16 (5.4)	35 (11.7)	142 (47.5)	98 (32.8)			
I am aware of accident reporting procedures					4	0.105	0.509
4 (1.3)	13 (4.3)	32 (10.6)	149 (49.5)	103 (34.2)			
I gave input in the design and layout of new equipment					4	0.129	0.327
32 (11.0)	52 (17.8)	58 (19.9)	95 (32.5)	55 (18.8)			
I participate in regular OSH committee meetings and workplace inspection					4	0.083	0.723
26 (8.7)	58 (19.5)	47 (15.8)	105 (35.2)	62 (20.8)			
Dangerous parts of work equipment are adequately guarded					4	0.136	0.235
2 (0.7)	17 (5.7)	19 (6.4)	151 (50.5)	110 (36.8)			
All workrooms are adequately ventilated					4	0.153	0.135
10 (3.3)	20 (6.7)	31 (10.3)	145 (48.3)	94 (31.3)			
My workroom temperature is comfortable					4	0.166	0.080
7 (2.3)	31 (10.3)	15 (5.0)	151 (50.0)	98 (32.5)			
My work station is always adequately lit					4	0.078	0.765
3 (1.0)	19 (6.3)	13 (4.3)	150 (50.0)	115 (38.3)			
Management understands safety and health issues in my work area					4	0.072	0.814
2 (0.7)	6 (2.0)	20 (6.6)	144 (47.8)	129 (42.9)			

Key: A-Strongly Disagree, B-Disagree, C-Uncertain, D-Agree, E-Strongly Agree

4.3.3 Participants Perceptions Regarding Safety in the Workplace

A total of 2(0.7%) participants strongly disagreed that their personal safety were prioritized in all company forums as standing agenda items, 5(1.7%) of them disagreed, 10(3.4%) were uncertain, 114(38.3%) agreed while 167(56.0%) strongly agreed (Table 4.13). Most workers (94.3%) confirmed that their safety was prioritized in all company forums as standing agenda items. This shows that the KBL organization takes care of the safety wellbeing of their workers. Human resource is an important asset to any company because the company cannot operate without workers.

The study found that, 4(1.3%) workers strongly disagreed that they were strongly encouraged to report unsafe conditions and behavior, 5(1.7%) disagreed, 6(2.0%) were uncertain, 106(35.1%) agreed while 181(59.9%) strongly agreed (Table 4.13). Employees are happy when they are allowed to report any unsafe conditions in their work place. In any organization communication is very important and it should be two-way traffic. According to a study that was done by Angelica and Vecchio (2007) communication allows people, tasks, processes and systems to interact purposively and cooperatively to achieve health and safety objectives. The way we communicate about safety issues as well as reporting any unsafe condition in a work place will influence whether or not people will understand and participate in a safety process. Communication and consultation in the workplace, is integral in achieving safe work environment by giving and receiving information about hazards and risks control, influencing attitude, unsafe and risky conditions, behaviors and building commitment and ownership. The internal communication types that can be used in the workplace include; presentation to senior management and staff health and safety committees, emails, videos, notice boards, newsletters, poster display, verbal and signage (Rivers, 2007). External communication can be achieved by use of annual reports, publications and telephone calls. It is important that information is presented in a manner recipients will understand (Vecchio *et al,* 2004). People will contribute more in an environment

that provides a framework for consultation and communication which creates the conditions where individuals are encouraged to report hazards, near misses and incidents according to (Standards Australia, 2001).

Regarding safety performance goal settings and reviews, 15(5.0%) workers strongly disagreed that they were involved in safety performance goal settings and reviews, 53(17.8%) disagreed, 32(10.7%) were uncertain, 123(41.3%) agreed while 75(25.2%) strongly agreed (Table 4.13). More than half of the participants confirmed that they were involved in safety performance goal settings and reviews. It is easy to minimize risks and accidents when all employees are involved from the very beginning during safety performance goal settings and also reviews of the same.

The results of this study showed that, 13(4.3%) workers disagreed that they underwent medical examinations before employment, 4(1.3%) were uncertain, 104(34.6%) agreed while 180(59.8%) strongly agreed (Table 4.13). Majority (94.4%) of the workers confirmed that they underwent medical examinations before employment. Pre-employment medical examination is very important because it helps identify the workers fitness to work. In case of occupational disease, workers medical records will be used for mitigations that is to rule out if the disease was acquired during work or before employment. 1(0.3%) worker strongly disagreed that regular medical tests were done to ascertain employee fitness to work, 21(7.0%) disagreed and were uncertain, respectively, 132(44.0%) agreed while 125(41.7%) strongly agreed. About 80.0% of the workers confirmed that regular medical examinations were conducted in the brewery. Medical examinations on occupational safety point of view help in early identification of occupational diseases and allow for timely mitigation plans. The result concurs with the work of Kimeto (2015) on pre-employment and post-employment medical examinations with over 75% of tea factory workers in his study confirming they undergo medical examinations.

The response showed that, 3(1.0%) participants strongly disagreed that they knew all the potential emergencies at their work areas, 13(4.3%) disagreed, 27(9.0%) were uncertain, 146(48.5%) agreed while 112(37.2%) strongly agreed (Table 4.13). Most (85.7%) participants in this study confirmed that they knew all the potential emergencies at their working areas. Workers at any work place must be conversant with all the potential emergencies and evacuation strategies. There were signs and symbols showing potential emergencies in the KBL during the time of the study.

Regarding emergency drills, 12(4.1%) workers strongly disagreed that they were involved in regular emergency drills to test preparedness, 44(14.9%) disagreed, 40(13.5%) were uncertain, 133(44.9%) agreed while 67(22.6%) strongly agreed (Table 4.13). Less than 40.0% of the workers confirmed that they were not involved in regular emergency drills to test preparedness while the rest were involved in such regular emergency drills to test preparedness. Emergency preparedness is crucial in any manufacturing firm especially brewing industrial since it involves a lot of risky activities.

In this study, 10(3.4%) participants strongly disagreed that there were adequate first aid kits and medical services, 23(7.7%) disagreed and were uncertain, respectively, 145(48.7%) agreed while 97(32.6%) strongly agreed (Table 4.13). First aid kits and medical devices go hand in hand with trained first aiders and medical services/personnel. In this study majority (81.3%) confirmed that adequate first aid kits and medical services were available in their work place. Those who were uncertain were working in departments that do not involve a lot of risk for example security and human resource departments among others. The study observed that there were first aids boxes distributed across all the departments of the brewery. Plate 4.5 shows a sample first aid box found at the brewery.

Plate 4.5: A first aid box at the brewery

Regarding fire safety, 1(0.3%) participant strongly disagreed that employees were aware of safety measures in case of fire, 17(5.7%) disagreed, 23(7.7%) were uncertain, 133(44.5%) agreed while 125(41.8%) strongly agreed that employees were aware of safety measures in case of fire (Table 4.13). About 86.3% of the workers confirmed that they were aware of safety measures in case of fire in their work place. There were well marked signage and symbols of fire hazards at the KBL as discussed elsewhere in this study. The symbols were visible to all the employees and visitors.

In this study, 1(0.3%) participant strongly disagreed that all non-routine, high risk tasks were controlled by permit to work, 6(2.0%) disagreed, 15(5.0%) were uncertain, 116(38.9%) agreed while 160(53.7%) strongly agreed. Most (92.6%) workers affirmed that all non-routine, high risk tasks were controlled through work permit. There were six

types of permits that were observed to be in use for high risk tasks, which includes; General Work, Hot Work, Electrical Work, Excavation Work, Confined Space Entry and Work at Height. Through this system workers have to be certified medically that they are fit to engage in high risk tasks and all necessary hazard mitigations are put in place before they are issued with work permits. In this study there was no significant association ($p<0.05$) between their awareness on any particular safety issue and their response on the same (Table 4.13).

The study observed that there were over 200 portable fire extinguishers distributed across the KBL sites. The fire extinguishers were wall or trolley mounted as required by OSHA (Plate 4.6). Additionally, available training records indicated that all staff and contractors are duly trained on basic firefighting skills at the induction stage.

Table 4.13: Participants awareness on safety in the workplace

Awareness of preventive measures	Response					df	χ^2	p
	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)	E (n) (%)			
Safety is prioritized in all company forums as a standing agenda item	2 (0.7)	5 (1.7)	10 (3.4)	114 (38.3)	167 (56.0)	4	0.126	0.313
I am strongly encouraged to report unsafe conditions and behavior	4 (1.3)	5 (1.7)	6 (2.0)	106 (35.1)	181 (59.9)	4	0.086	0.689
I am involved in safety performance goal setting and review	15 (5.0)	53 (17.8)	32 (10.7)	123 (41.3)	75 (25.2)	4	0.127	0.31
I underwent medical examinations before employment	0 (0.0)	13 (4.3)	4 (1.3)	104 (34.6)	180 (59.8)	3	0.074	0.65
Regular medical tests are done to ascertain employee fitness to work	1 (0.3)	21 (7.0)	21 (7.0)	132 (44.0)	125 (41.7)	4	0.132	0.262
I often attend pre-shift safety tool box talks	16 (5.4)	55 (18.6)	44 (14.9)	117 (39.5)	64 (21.6)	4	0.214	0.009
I know all the potential emergencies at my work area	3 (1.0)	13 (4.3)	27 (9.0)	146 (48.5)	112 (37.2)	4	0.133	0.259
I am involved in regular emergency drills to test preparedness	12 (4.1)	44 (14.9)	40 (13.5)	133 (44.9)	67 (22.6)	4	0.104	0.523
There are adequate first aid kits and medical services	10 (3.4)	23 (7.7)	23 (7.7)	145 (48.7)	97 (32.6)	4	0.104	0.519
Employees are aware of safety measures in case of fire	1 (0.3)	17 (5.7)	23 (7.7)	133 (44.5)	125 (41.8)	4	0.114	0.424
All non-routine, high risk tasks are controlled by permit to work	1 (0.3)	6 (2.0)	15 (5.0)	116 (38.9)	160 (53.7)	4	0.124	0.337

Key: A-Strongly Disagree, B-Disagree, C-Uncertain, D-Agree, E-Strongly Agree, p-level of significance

Plate 4.6: Portable fire extinguishers

4.3.4 Workers response to OSH continuous improvement activities

The results showed that, 1(0.3%) workers strongly disagreed that all plants and equipment were well maintained, 8(2.7%) disagreed, 19(6.4%) were uncertain, 165(55.2%) agreed while 106(35.5%) strongly agreed that all plants and equipment were generally well maintained (Table 4.14). More than 80.0% of the participants affirmed that plant and equipment were generally well maintained in this study. Similarly, 1(0.3%) participant strongly disagreed that the plants and equipment underwent statutory inspections as scheduled, 5(1.7%) disagreed, 27(9.2%) were uncertain, 148(50.2%) agreed while 114(38.6%) strongly agreed (Table 4.14). Almost 90.0% of the workers in this study affirmed that the plants and equipment underwent statutory inspections as scheduled. This was corroborated by records of statutory inspection reports seen at the brewery further confirming that the company strives to comply with OSHA (2007) on statutory inspection of specialized plant and machinery.

Regarding accidents investigations, 2(0.7%) workers strongly disagreed that all incidents/accidents were objectively investigated, 10 (3.3%) disagreed, 21 (7.0%) were uncertain, 145(48.5%) agreed while 121(40.5%) strong agreed (Table 4.14). Approximately 90.0% of the participant agreed that all incidents/accidents were objectively investigated. In any work set up, accidents/incidents should be properly investigated so as to come with solutions and avert future recurrence. Similarly, 6(2.0%) workers strongly disagreed that the lessons from accident investigations were shared with all stakeholders, 20(6.8%) disagreed, 40(13.6%) were uncertain, 134(45.4%) agreed while 95(32.2%) strongly agreed. 77.6% of the workers confirmed that lessons from accident investigations were shared with all stakeholders. These lessons should be shared with all stakeholders in order to avoid the recurrence of such mistakes in future.

Regarding the disciplinary procedures in place at KBL, 2(0.7%) workers strongly disagreed that they were familiar with the company disciplinary procedures, 11(3.7%) disagreed, 27(9.0%) were uncertain, 148(49.3%) agreed while 112(37.3%) strongly agreed (Table 4.14). Overwhelming majority (86.6%) of the participants affirmed that they were familiar with the company disciplinary procedures while the rest were not conversant may be due to ignorance. Two [2(0.7%)] workers strongly disagreed that the hazards control measures in place were adequate and effective, 8(2.7%) disagreed, 17(5.7%) were uncertain, 178(59.3%) agreed while 95(31.7%) strongly agreed. Adequate and effective hazard control measures assist in accident reduction in any work environment. In this study, 2(0.7%) workers strongly disagreed that there was continuous review of accident prevention measures, 7(2.3%) disagreed, 31(10.3%) were uncertain, 161(53.7%) agreed while 99(33.0%) strongly agreed (Table 4.14). Continuous review of accident prevention measures is crucial since it helps identify the appropriate mitigations for any emergent hazards and related risks.

Four [4(1.3%)] workers strongly disagreed that their supervisors always prioritized safety over other objectives, 10(3.4%) disagreed, 10(3.4%) were uncertain, 137(46.0%) agreed while 137(46.0%) strongly agreed that their supervisors always prioritized safety over other objectives (Table 4.14). Safety precaution is very important in any work environment and it is the responsibility of the organization through the management to the supervisory level to ensure that safety is given a first priority. The OSHA (2007) part II 6 (1); "Every occupier shall ensure the safety, health and welfare at work of all persons working in his workplace. (2); Without prejudice to the generality of an occupier's duty under subsection" (1), "The duty of the occupier includes - (a) the provision and maintenance of plant and systems and procedures of work that are safe and without risks to health; (b) arrangements for ensuring safety and absence of risks to health in connection with the use, handling, storage and transport of articles and substances; (c) the provision of such information, instruction, training and supervision as is necessary to ensure the safety and health at work of every person employed (d) the maintenance of any workplace under the occupier's control, in a condition that is safe and without risks to health and the provision and maintenance of means of access to and egress from it that are safe and without such risks to health; (e) the provision and maintenance of a working environment for every person employed that is, safe, without risks to health, and adequate as regards facilities and arrangements for the employees welfare". Therefore it is the duty of the employer to provide a safe working environment while the worker is required to work safely.

Three [3(1.0%)] workers in the study strongly disagreed that the safety passport training had helped integrate contractors into KBL family, 9(3.0%) disagreed, 9(3.0%) were uncertain, 123(41.1%) agreed while 155(51.8%) strongly agreed (Table 4.14). 92.2% of the workers confirmed that the safety passport training had helped integrate contractors into KBL family. This shows that passport training availed to all contractor workers at the brewery has been effective in bridging the safety culture between employees and contractors. Similarly, 81(27.1%) participants strongly disagreed that there were big gap

in contractor and KBL staff safety cultures, 81(27.1%) disagreed, 21(7.0%) were uncertain, 53(17.7%) agreed while 63(21.1%) strongly agreed (Table 4.14). A few (38.8%) workers confirmed that there were big gaps in contractor and KBL staff safety cultures. Three [3(1.0%)] participants strongly disagreed that in their opinion, safety performance had improved over the last five years, 1(0.3%) disagreed, 24(8.0%) were uncertain, 122(40.7%) agreed while 150(50.0%) strongly agreed. Most (90.7%) workers confirmed that safety performance had improved over the last five years. This is due to the enforcement of the Occupational safety and Health Act of 2007 by the KBL management over the years. In this study there was no significant association between the safety measure put in place and the employee response in all the questions since all the p-values are more than 0.05 ($p>0.05$) as shown in Table 4.14.

Table 4.14: Workers response to OSH related activities

Other OSH related activities	Response					df	χ^2	Sig.
	A (n) (%)	B (n) (%)	C (n) (%)	D (n) (%)	E (n) (%)			
All plant and equipment is generally well maintained						4	0.192	0.026
	1 (0.3)	8 (2.7)	19 (6.4)	165 (55.2)	106 (35.5)			
Plant and equipment undergoes statutory inspections as scheduled						4	0.081	0.75
	1 (0.3)	5 (1.7)	27 (9.2)	148 (50.2)	114 (38.6)			
All incidents / accidents are objectively investigated						4	0.119	0.376
	2 (0.7)	10 (3.3)	21 (7.0)	145 (48.5)	121 (40.5)			
Learning from accident investigations are shared with all stakeholders						4	0.11	0.47
	6 (2.0)	20 (6.8)	40 (13.6)	134 (45.4)	95 (32.2)			
I am familiar with the company disciplinary procedure						4	0.058	0.909
	2 (0.7)	11 (3.7)	27 (9.0)	148 (49.3)	112 (37.3)			
Hazard control measures in place are adequate and effective						4	0.107	0.491
	2 (0.7)	8 (2.7)	17 (5.7)	178 (59.3)	95 (31.7)			
There is a continuous review of accident prevention measures						4	0.158	0.113
	2 (0.7)	7 (2.3)	31 (10.3)	161 (53.7)	99 (33.0)			
My supervisor always prioritizes safety over other objectives						4	0.074	0.8
	4 (1.3)	10 (3.4)	10 (3.4)	137 (46.0)	137 (46.0)			
The safety passport training has helped integrate contractors into KBL family						4	0.117	0.394
	3 (1.0)	9 (3.0)	9 (3.0)	123 (41.1)	155 (51.8)			
There is a big gap in contractor and KBL staff safety culture						4	0.093	0.624
	81 (27.1)	81 (27.1)	21 (7.0)	53 (17.7)	63 (21.1)			
In my opinion, safety performance has improved over the last five years						4	0.147	0.166
	3 (1.0)	1 (0.3)	24 (8.0)	122 (40.7)	150 (50.0)			

Key: A-Strongly Disagree, B-Disagree, C-Uncertain, D-Agree, E-Strongly Agree, p-level of significance

4.4 Nature and frequency of accidents, injuries and their causes

The following were some of the accidents and their causes that were observed by this study; chemical exposure, fire, muscle strain, dislocation of limbs, exposure to hot surfaces and cut by cullet. Most (66.7%) respondents had experienced minor cut by glass cullet (Figure 4.2). Cuts are caused by broken glass mainly at the Packaging and Logistics departments and also sharp tools in the Engineering departments. Accidents like caustic leakage, fire accident are common in a manufacturing industry specifically because the former is used in cleaning while the presence of flammables increases the risk of fire. Manual handling of loads leads to musculoskeletal injuries such as joint dislocation, muscle strain and lower back pains. Muchemedzi and Charamba (2006) in their study explained that accidents do not usually arise from a single cause but from a combination of factors which may act simultaneously. A potentially unsafe situation does not cause accident until someone is exposed to it. Accidents are caused by the result of unsafe acts or practices (the human element that results from poor attitudes, physical conditions and lack of knowledge or skills to enable one to work safely). They are also caused by the result of unsafe conditions of equipment or materials. Adebiyi *et al*, (2006) in a similar study noted that the consequences of accidents, in some cases, are not borne only by those directly involved but extended to relatives, friends, employers and government. Despite all established standards and legislations on safety, with sophisticated devices developed and researches carried out, a perfectly safe condition for human beings and property is still an illusion (Adebiyi *et al.*, 2006)

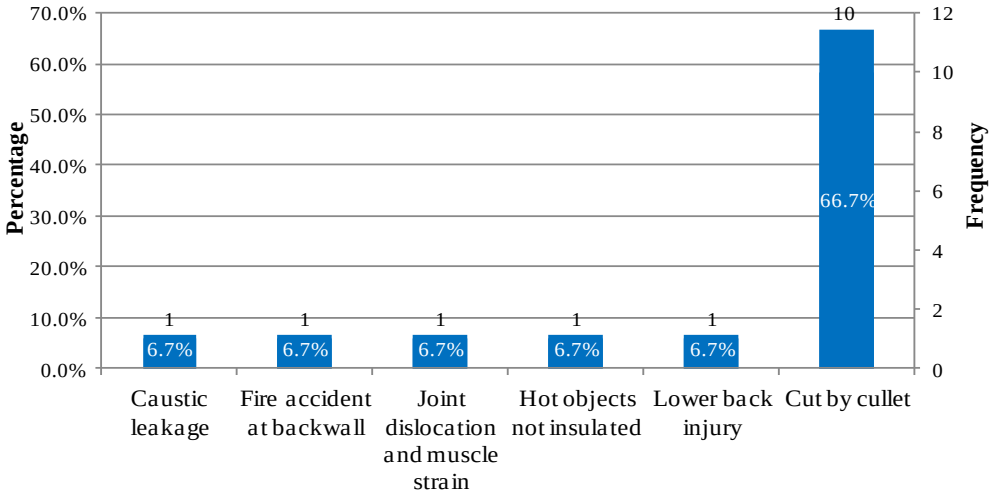


Figure 4.2: Occupational accidents / injuries at KBL

Respondents cited the following activities which they were involved in as having great potential to cause accidents at KBL:-

a) Work at height e.g. while cleaning process vessels or chimneys
b) Interaction with vehicular traffic particularly in Logistics yard
c) Intensive construction works for new installations or renovations
d) Manual handling e.g. loading of beer crates and keg barrels and equipment involved in engineering maintenance works
e) Exposure to hazardous substances e.g. ammonia, fossil oils and grain dusts etc.
f) Work in confined spaces during maintenance works

All the above activities have great potential to cause minor or even major accidents some of which can be fatal, hence the need to have effective hazard mitigation plans in place.

4.4.1 Nature of Injuries Sustained

Pursuant to understanding the nature of injuries sustained at KBL accident records for the year 2013 were reviewed. The records showed that of 77 injuries were recorded in this financial year. They indicated the most prevalent injuries as cut by cullet (broken glass) – 39%, cut other sharp objects (primarily sharp edges in construction and engineering maintenance works) – 29%, trauma or impact injuries – 29% and chemical burns – 4% (Figure 4.3). A similar study by Oyawale *et al.*, (2011) in a brewing industry in Nigeria found that the workers sustained almost similar injuries as reported by the current study. They also reported that there is higher incidence of work-related injuries in developing world than in the developed ones.

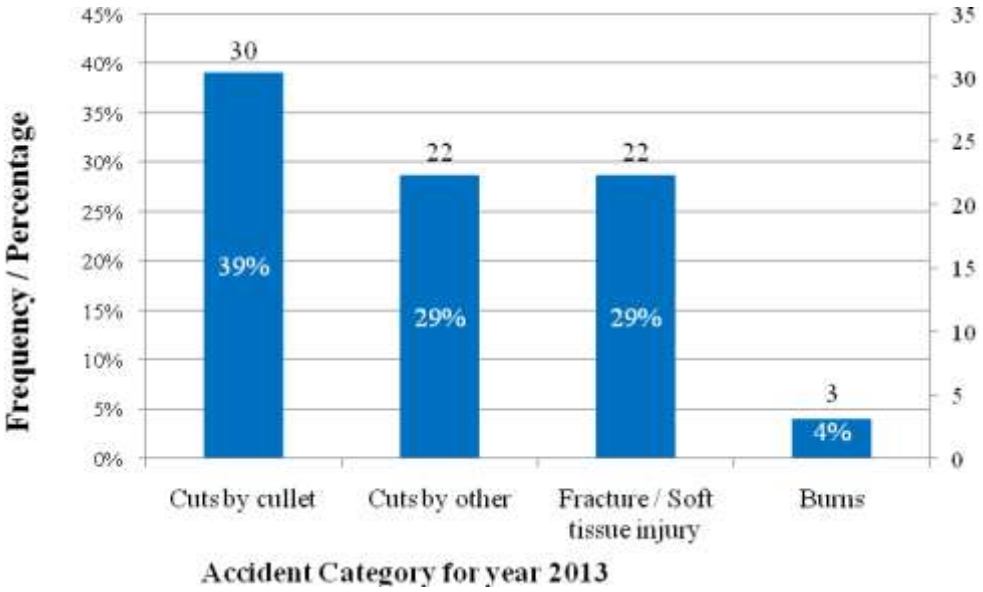


Figure 4.3: Accident / injury categories at KBL for 2013

Among the employees, 13(4.3%) had been treated for injuries they sustained while working at the breweries while majority [289 (95.7%)] had not sustained any injury while working at KBL. This shows that most workers at brewery are aware of the

hazards that might lead to injuries and are thus able to protect themselves against such injuries. There was significant association (p=0.02) between the number of workers treated for a particular injury and the department a worker comes from (Table 4.15). Duignan, (2003) and Burns, (2006) in similar studies reported that undesirable events at the industry may lead to human injury, damage to property and loss of production hours, disease, permanent disability or death.

Table 4.15: Analysis of occupational injuries by department

Department	**Treated for injuries sustained at work**			
	Yes (n) (%)	No (n) (%)	Total (n) (%)	p-value
Manufacturing (Spirits/ Brewing/ Packaging/ Quality)	9 (7.8)	107 (92.2)	116 (100.0)	0.02
Sales, Marketing and Logistics	1 (1.1)	93 (98.9)	94 (100.0)	
Human Resource and Security	0 (0.0)	56 (100.0)	56 (100.0)	
Engineering & Services (incl. Finance & Procurement)	3 (8.3)	33 (91.7)	36 (100.0)	
Total	13 (4.3)	289 (95.7)	302 (100.0)	

Among the participants, 1(0.3%) had been hospitalized as a results of an accident sustained at KBL while 301(99.7%) had not been hospitalized for the same. Minor injuries sustained do not warrant hospitalization while major accidents lead to hospitalization of workers. There was no significant association (p=0.66) between being hospitalized as a result of an accident and the department an employee comes from (Table 4.16).

Table 4.16: Analysis of workers hospitalized by department

Department	Hospitalized as a result of accident sustained at KBL			
	Yes (n) (%)	No (n) (%)	Total (n) (%)	p-value
Manufacturing (Spirits/ Brewing/ Packaging/ Quality)	1 (0.9)	115 (99.1)	116 (100.0)	0.66
Sales, Marketing and Logistics	0 (0.0)	94 (100.0)	94 (100.0)	
Human Resource and Security	0 (0.0)	56 (100.0)	56 (100.0)	
Engineering & Services (incl. Finance and Procurement)	0 (0.0)	36 (100.0)	36 (100.0)	
Total	1 (0.3)	301 (99.7)	302 (100.0)	

4.4.2 Accident Statistics

The OSH performance of KBL over the five years between 2010 and 2014 was reviewed in terms of accident statistics. During the period under review contractors contributed 349 (88.1%) out of the 396 occupational accidents recorded. A perusal of the records availed indicate a significant reduction of the total number of accidents from 155 in 2010 to only 28 in 2014 which translates to 81.9% reduction (Figure 4.4). It was understood that the staffing levels over the five years under review remained relatively constant i.e. with a ratio of 400 to 1000 for employee to contractors. With this in mind, a comparison was made for the accident rate contribution for employees versus that of contractors. The results indicate a similar improvement trend as illustrated in figure 4.5. (accident rate is the ratio of number of accidents to number of workers for each category)

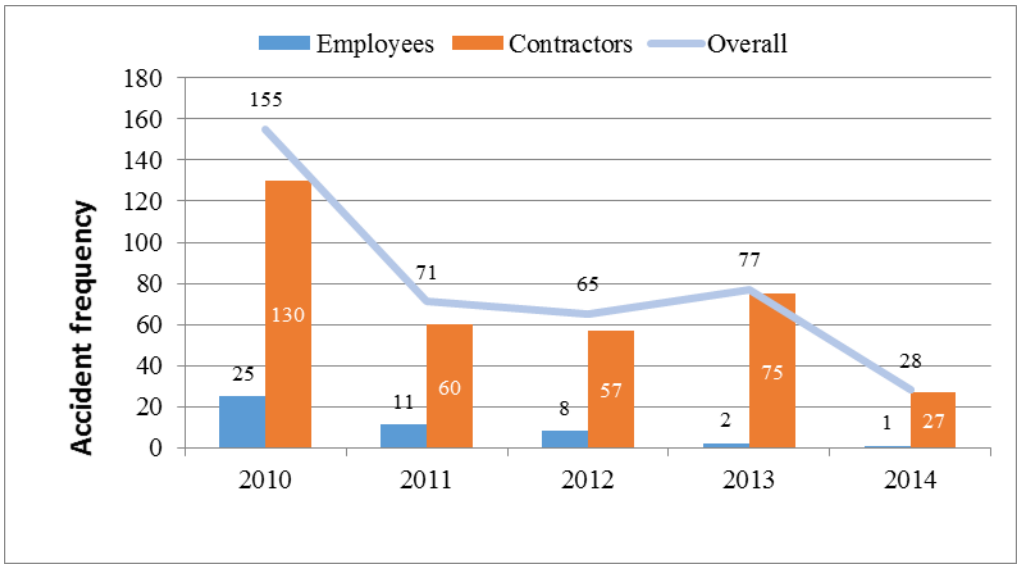
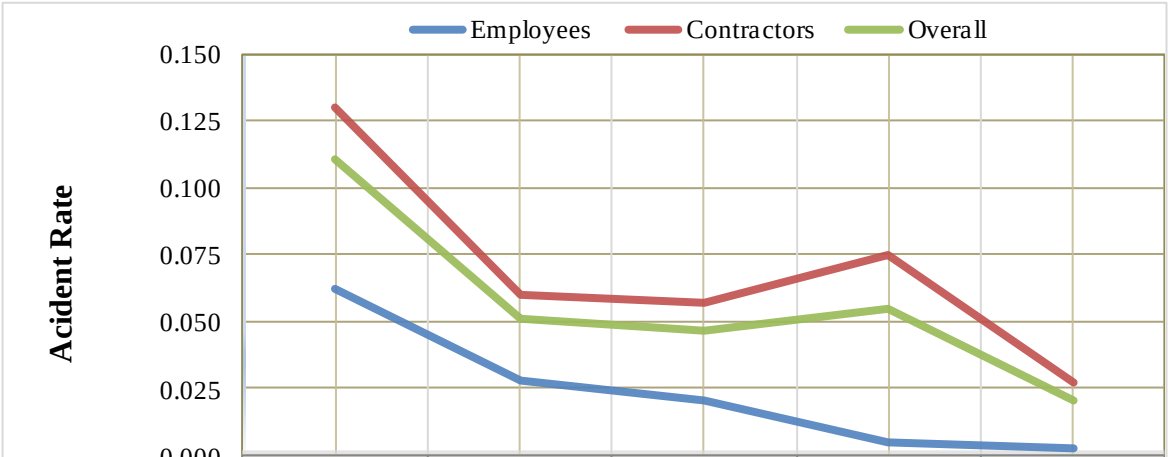


Figure 4.4: Accident statistical trends from 2010 to 2014



	2010	2011	2012	2013	2014
Employees	0.063	0.028	0.020	0.005	0.003
Contractors	0.130	0.060	0.057	0.075	0.027
Overall	0.111	0.051	0.046	0.055	0.020

Figure 4.5: Accident rates from 2010 to 2014

Further scrutiny of the accident records indicates that during the review period, manufacturing department contributed 174 (44%) accidents followed by Sales Marketing and Logistics with 130 (33%), Engineering & Services with 71 (18%) and HR & Security with the least at 21 (5%) – Figure 4.6

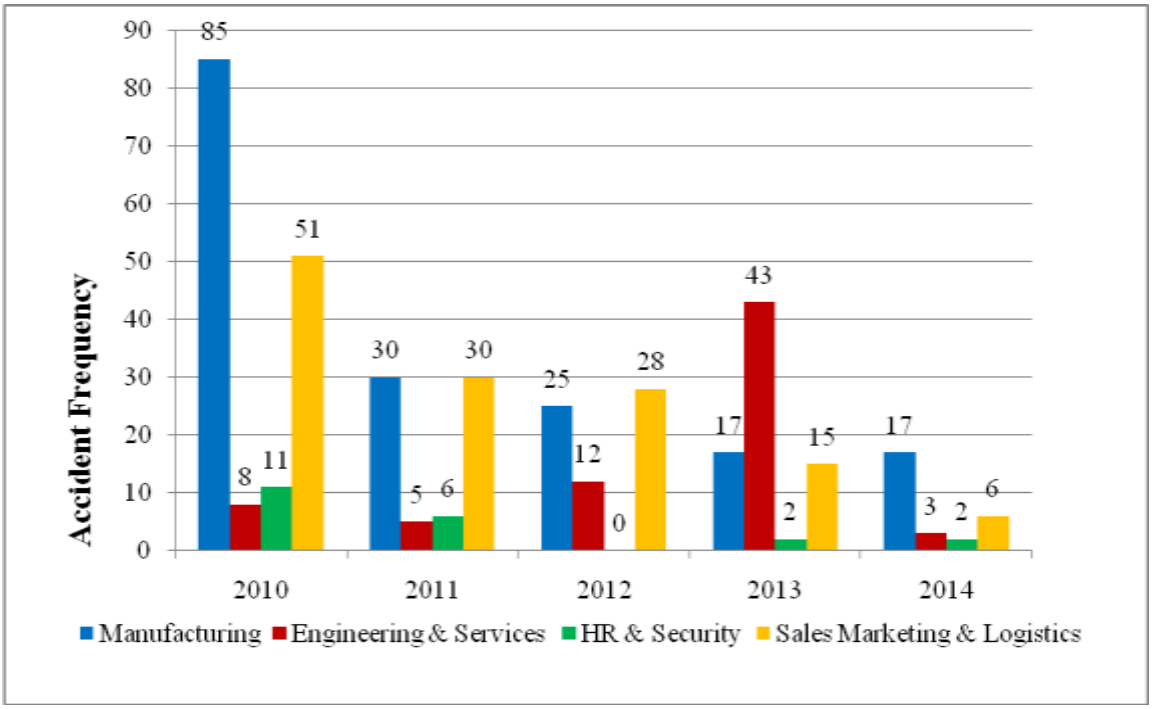


Figure 4.6: Accident distribution across departments

It is clear that majority of accidents occurred in manufacturing department, followed by Sales and Logistics. Since 2010 all departments recorded decreasing accidents apart from Engineering department which recorded an increase in 2013 – this was attributed to massive expansion projects within the brewery which resulted in many new contractors involved in high risk construction works. It is also important to note that the contractor management programs cited elsewhere in this report, particularly the passport training, all commenced in 2010, hence there appears a direct relationship between accident reduction and safety passport training.

4.5 Effectiveness of Contractor Management Programs on OSH

The study showed that 15(5%) participants assessed that introduction of contractor safety passport training was least effective in improving OSH performance at KBL, 5(1.7%) stated that the training was slightly effective, 26(8.6%) stated that it was somewhat effective, 71(23.6%) stated that it was moderately effective while 184(61.1%) stated that the training was most effective (Table 4.17, Figure 4.7). About 84.7% of all the workers stated that introduction of contractor safety passport training was effective in improving OSH performance at KBL. For OSH training to be effective, the trained individuals should be able to apply the knowledge at their respective work station. Indicators of effective training are such as reduced accidents/incidents, increased workers morale and so on. Hughes and Ferrett, (2011) found out that in any workplace where employees work on temporary engagements, attention is mainly on negative outcomes and workers are afraid to report any accident or incident for fear of being fired. As long as there are no serious accidents, occupational health and safety policies and practices are not carried out fully. As a result, threats to employees' safety are not eliminated in time because accident-prone areas are not recognized and taken care of before accidents occur. It is therefore important that the conditions that pose threat to the safety and health of all workers especially on contract terms are identified and addressed amicably (Taderera, 2012). A similar study by Dey *et al.* (2012) found that the beer industry faces challenges in ensuring occupational safety and health because of the contractor's mindset of considering safety as a liability to their profit/business and the lack of safety awareness amongst the workers. They maximize profit at the expense of safety of their workers who are on temporary engagement.

Along the same perspective, Burke *et al.* (2006) sought to evaluate the effectiveness of a variety of employee safety and health training programs aimed at increasing the safety knowledge and performance as well as reducing accidents, injuries, and diseases. His study analyzed 95 quasi-experimental studies, which had employed different methods of

employee safety and health training including the use of lectures, programmed instructions, and behavioral modeling among others. The study findings show that the most engaging training methods such as behavioral modeling produced the highest positive outcomes in terms of increasing employee knowledge acquisition and reduction of different negative outcomes (Gunningham, 2008). Moreover, all the methods analyzed produced different levels of significant behavioral performance improvement (Burke *et al*., 2006). These findings uphold the recommendations proposed by Reber and his colleagues in that behavioral modeling is an effective worker safety and health training method. Furthermore, the results of this study are highly transferable because it incorporates a large sample of workers belonging to different categories including management, supervision, cleaners, and construction workers among others. However, the generalizability of these study findings to the case of KBL cannot be guaranteed owing to significant differences between the work environment in western countries and Kenya (Lunt & Bates, 2008; Fidderman & McDonnell, 2010).

Regarding safety officers appointment, 14(4.7%) participants stated that appointment of safety officers and departmental representatives for both contractors and permanent workers was least effective in improving OSH performance at KBL, 31(10.3%) stated that it was slightly effective, 75(24.9%) stated that it was somewhat effective, 90(29.9%) stated that it was moderately effective, 88(29.2%) stated that the it was most effective while 3(1%) did not respond to this statement (Table 4.17, Figure 4.7). About 60% of the workers stated that appointment of safety officers and departmental representatives was effective in improving OSH performance at KBL. Safety officers should be appointed from the two cadres of staffs for it to be effective. Safety officers appointed at the shop floor level are quite instrumental in keeping the safety focus at the task level. In addition, they help in conducting task-based risk assessments, safety compliance audits (such as PPE), accident reporting and investigation as well as keeping all relevant safety records.

Among the participants, 15(5%) stated that scheduled workplace inspections/ audits involving all stakeholders was least effective in improving OSH performance at KBL, 23(7.6%) stated that it was slightly effective, 60(19.9%) thought that it was somewhat effective, 98(32.6%) stated that it was moderately effective, 103(34.2%) stated that the it was most effective while 2(0.7%) did not respond to this statement (Table 4.17, Figure 4.7). About 66.8% of the workers confirmed that scheduled workplace inspections/audits involving all stakeholders were effective in improving OSH performance at KBL. This shows that it is important to involve all stake holders in the industry when planning for OSH of the workers. Rush (2006) in his study on OSH of brewery workers found that all stake holders were involved in workplace inspections/ audits.

Similarly 9(3%) participants stated that OSH performance goal setting and review in line with zero harm was least effective in improving OSH performance at KBL, 105(34.9%) stated that it was moderately effective while, 117(38.9%) stated that it was most effective. Most (73.8%) workers confirmed that goal setting and review in line with zero harm was effective in improving OSH performance at KBL. The result of this study on OSH performance goal setting concurs with that of Sakamoto and Konings (2003) who found that 70.0% of the workers accepted that goal setting and review in line with zero harm was effective in improving OSH performance. In the current study goal setting was found to be lacking or inadequate.

A total of 47(15.6%) participants stated that regular safety-only meetings between KBL management and contractor directors was least effective in improving OSH performance at KBL, 35(11.6%) stated that it was slightly effective, 60(19.9%) thought it was somewhat effective, 76(25.2%) stated that it was moderately effective, 79(26.2%) stated that it was most effective, 4(1.3%) did not respond to this statement. Over 50.0% of the participants confirmed that regular safety meetings between KBL management and contractor directors were effective in improving OSH performance at KBL. Manufacturing industries should involve the contractors in their quest to improve OSH

performance in their companies and reduce costly incidents and accidents. Managers should establish a relationship with their workers that encourage open and honest discussion and mutual trust. Communication often fails due to the following: lack of clarity of message, absence of emotional resonance in one's message, inaccurate targeting, poor timing and no genuine feedback process.

Regarding safety performance incentives, 28(9.3%)workers stated that safety performance incentive schemes and recognition was least effective and slightly effective in improving OSH performance at KBL, respectively, 70(23.3%) stated it was somewhat effective, 91(30.2%) stated that it was moderately effective, 80(26.6%) stated that it was most effective while 4(1.3%) did not respond. About 56.8% of the workers confirmed that safety performance incentive schemes and recognition was effective at the KBL. Those workers who work safely should be given incentives for them to keep working safely and encourage their partners to work safely.

In this study, 16(5.3%) employees stated that robust accident/ incident reporting procedures and shared learnings through safety alerts was least effective in improving OSH performance at KBL, 23(7.6%) stated that it was slightly effective, 55(18.3%) thought that it was somewhat effective, 97(32.2%) stated that it was moderately effective, 106(35.2%) stated that it was most effective while 4(1.3%) did not respond (Table 4.17, Figure 4.7). All employees require information, advice, assistance and training to do their work, fully understand the health and safety risks that are part of their work and help keep their work environment safe.

According to Catherine *et al.* (2001), it is important to post information about job hazard analyses, results of inspections and analyses of injuries / accident investigations. Regular discussions about inspections, investigations, productivity, or injury records ensure that everyone is informed about what happened and what is expected. The upward safety communication is applied to employees through the three actions; reporting of accidents and near misses, hazard and risk communication and recommendations to improve

safety practices. The current study observed at the KBL the upward safety communication is applied to employees through the three actions as stated above.

Nine [9(3%)] participants stated that strict adherence to Safe Operating Procedures and PPE was least effective and slightly effective, respectively in improving OSH performance at KBL, 26(8.6%) thought it was somewhat effective, 60(19.9%) stated that it was moderately effective, 194(64.5%) stated that the it was most effective while 3(1%) did not respond (Table 4.17, Figure 4.7). Majority (84.4%) of the workers confirmed that strict adherence to Safe Operating Procedures and PPE was effective and in improving OSH performance at KBL. OSHA (2007) stipulates that it is the responsibility of the employer to provide a safe working environment to the workers including the provision of appropriate and well maintained PPE.

In this study majority of the workers were confirmed to be using different PPE's for different jobs. It shows that at the KBL, PPE are provided to all cadres of staff. In a similar study conducted in Vishakapatnam Steel plant of India 27.5% of the workers were using PPE (Ziauddin, 2006). A study carried in a sample of 501 male printing workers from 28 factories in Hong Kong showed that 22.05% of workers were using PPE (Yu, 2005). Another study among dyes printing workers found that 34% of the workers were using PPE (Paramasivam *et al.,* 2010).

Regarding disciplinary action, 15(5%) participants stated that robust enforcement of disciplinary framework was least effective in improving OSH performance at KBL, 17(5.6%) stated that it was slightly effective, 46(15.3%) thought that it was somewhat effective, 84(27.9%) stated that it was moderately effective, 135(44.9%) stated that it was most effective while 4(1.3%) did not respond (Table 4.17, Figure 4.7). Most (72.8%) workers confirmed that robust enforcement of disciplinary framework was effective in improving OSH performance at KBL. Enforcement of disciplinary measures is very important so that errant workers will not repeat the same mistakes.

Henshaw (2002) in his study explained the importance of effective communication and clear disciplinary frame-work because ineffective communication can have a substantial amount of negative impact on OSH management. In some workplaces, language differences can present significant challenges to communicating health and safety information, discussing OSH issues and ensuring safe work practices. Sometimes finding the right time and delivering messages in the right way can be a challenge. According to a study done by Victoria (2008) the first step in improving communications in the workplace is to examine the information that is currently available to employees. Common examples of health and safety information include: the company's health and safety policy, the location and nature of hazards in the workplace, procedures for safe operation, use, maintenance and replacement of protective equipment, injury and incident reporting procedures, consultation structures (designated work groups, management, contacts and meeting schedules), procedures for resolving health and safety issues, emergency and first aid procedures and safety signs and symbols.

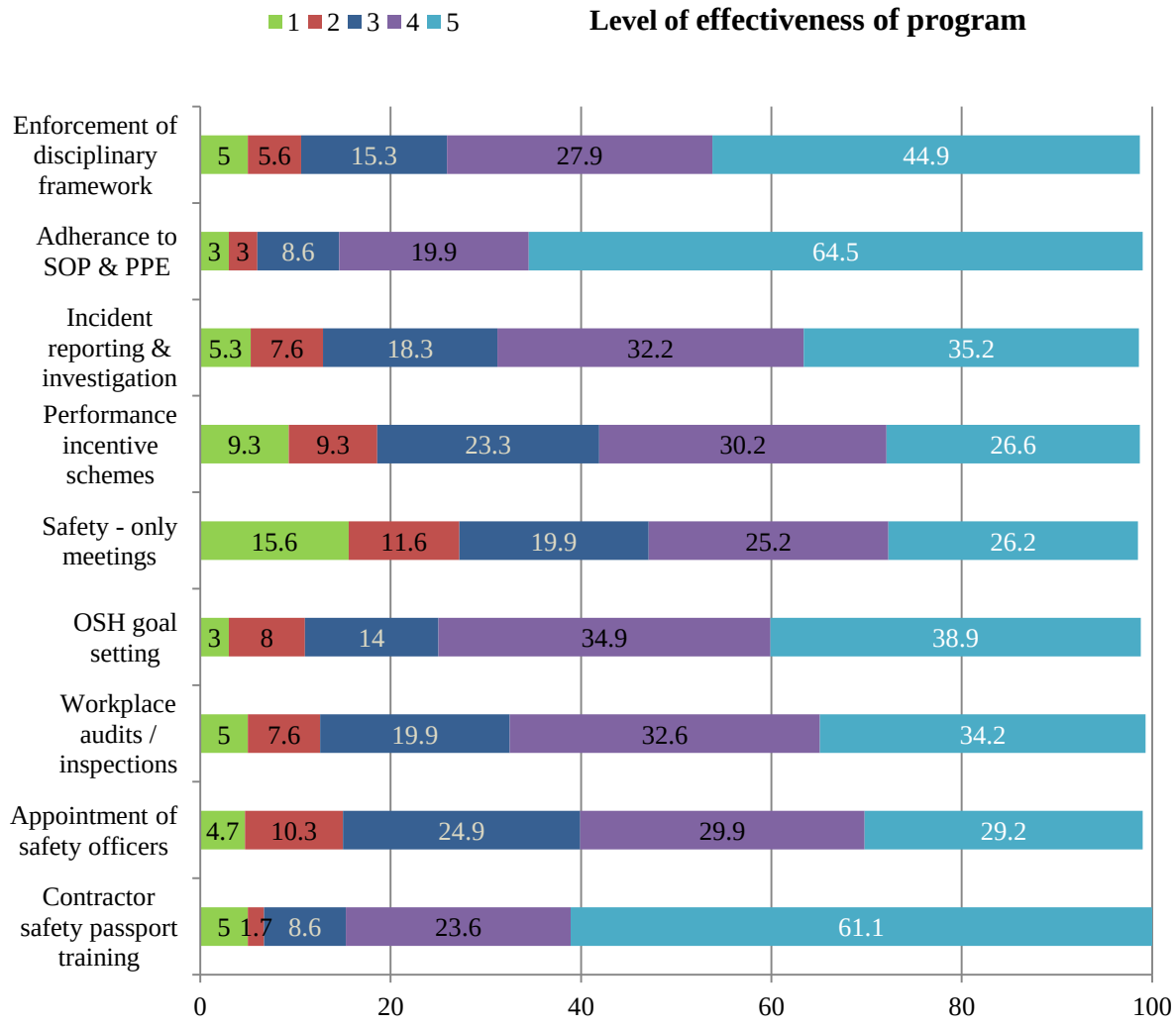


Figure 4.7: Effectiveness of contractor management programs

Table 4.17: Effectiveness of contractor management programs on OSH

Program/ Effectiveness	1 (n) (%)	2 (n) (%)	3 (n) (%)	4 (n) (%)	5 (n) (%)	No Response (n) (%)	Total (n) (%)
Introduction of contractor safety passport training	15 (5.0)	5 (1.7)	26 (8.6)	71 (23.6)	184 (61.1)	0 (0.0)	301 (100.0)
Appointment of safety officers and departmental representatives	14 (4.7)	31 (10.3)	75 (24.9)	90 (29.9)	88 (29.2)	3 (1.0)	301 (100.0)
Scheduled workplace inspections / audits involving all stakeholders	15 (5.0)	23 (7.6)	60 (19.9)	98 (32.6)	103 (34.2)	2 (0.7)	301 (100.0)
OSH performance goal setting and review in line with zero harm	9 (3.0)	24 (8.0)	42 (14.0)	105 (34.9)	117 (38.9)	4 (1.3)	301 (100.0)
Regular safety-only meetings between KBL management and contractor directors	47 (15.6)	35 (11.6)	60 (19.9)	76 (25.2)	79 (26.2)	4 (1.3)	301 (100.0)
Safety performance incentive schemes and recognition	28 (9.3)	28 (9.3)	70 (23.3)	91 (30.2)	80 (26.6)	4 (1.3)	301 (100.0)
Robust accident / incident reporting procedures and shared learning through safety alerts	16 (5.3)	23 (7.6)	55 (18.3)	97 (32.2)	106 (35.2)	4 (1.3)	301 (100.0)
Strict adherence to Safe Operating Procedures and PPE	9 (3.0)	9 (3.0)	26 (8.6)	60 (19.9)	194 (64.5)	3 (1.0)	301 (100.0)
Robust enforcement of disciplinary framework	15 (5.0)	17 (5.6)	46 (15.3)	84 (27.9)	135 (44.9)	4 (1.3)	301 (100.0)

Key: 1-Least effective, 2-Slightly effective, 3-Somewhat, 4-Moderately effective, 5-Most effective, n-number/frequency, %-percentage, (n) (%)

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

Workers at KBL are exposed to different types of hazards in the categories of physical, mechanical, biological chemical, ergonomic and psychological hazards. Awareness level was more than 60.0% for all these hazards in this study. This implies that OSH is well managed at the KBL. Most (93.8%) workers confirmed that falls from height were well managed. Majority (91.5%) of the workers confirmed that collision with moving vehicles was well managed at KBL. Most (79.6%) workers confirmed that biological hazards were well managed. Majority of the participants (90.4%) confirmed that chemical hazards were well managed. Slightly more than 50.0% confirmed that ergonomic hazards were well managed, hence there is need to understand the specific concerns of half of the respondents who would like these specific hazards managed better.

The study found out that various OSH activities and programs shape and define the OSH status at KBL and help create awareness of hazard control measures. They include formulation of relevant OSH policies, hazard identification & risk assessment in respective departments and determination of appropriate mitigations, formulation of adequate OSH policies e.g. training of emergency teams and formation of OSH committees at different levels. Most (93.4%) workers were aware of hazards in their respective workplaces; 95.0% of workers assessed the existing OSH policies as adequate. Majority (93.6%) confirmed that relevant safety information was available to all staff. Most (73.8%) workers in this study were involved in risk assessment. An overwhelming majority (80.3%) confirmed the presence of trained first aiders in their work place. More than half of the participants confirmed that they are allowed to participate in regular OSH committee meetings and workplace inspections. This implies

that OSH is reasonably well managed at the KBL but there is still opportunity for improvement.

Based on accident statistics from 2013, the most prevalent accidents and injuries resulted from cuts by cullet (39%), cuts by other sharp objects whilst undertaking construction or engineering maintenance works (29%), trauma or impaction injury (29%) and chemical burns (4%). The accident rate at KBL has been on an improvement trend since 2010 with a massive reduction of over 80% by the end of 2014.

Effectiveness of contractor management programs on occupational safety and health was more than 50.0%, hence all the contractor management programs were very effective according to this study. For example; - About 84.7% of all the workers stated that introduction of contractor safety passport training was effective in improving OSH performance at KBL. Most workers (60%) stated that appointment of safety officers and departmental representatives was effective in improving OSH performance at KBL. About 66.8% of the workers confirmed that scheduled workplace inspections/ audits involving all stakeholders were effective in improving OSH performance at KBL. Most (73.8%) workers confirmed that goal setting and review in line with zero harm was effective in improving OSH performance at KBL. Over 50.0% of the participants confirmed that regular safety meeting between KBL management and contractor directors was effective in improving OSH performance at KBL.

5.2 Recommendations

The study recommends the following measures to be observed at KBL in order to consolidate the gains already being realized and safeguard occupational safety, health and welfare of all workers:-

a) Involve contractors and their managers in regular safety meetings, risk assessments and workplace inspections. This will help unearth all concerns particularly where workers feel specific hazards need to be better managed, promote ownership of OSH issues and ultimately develop a positive safety culture.
b) Review programs targeting control of non-routine, high risk tasks such as construction and engineering maintenance works.
c) Develop a program that specifically focuses on reduction or elimination of cullet cuts since this is the leading occupational injury recorded at the brewery.
d) Introduce annual safety passport / OSH refresher training to all staff. This will assure continued awareness creation.

Further research is recommended in similar manufacturing firms, so as to help in setting feasible OSH industry benchmarks.

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APPENDICES

Appendix A1: Approval from KBL to conduct research

LETTER REQUESTING PERMISSION TO CONDUCT RESEARCH

John Githiri P. Kimani
PO Box 47321-00100
Nairobi
0710880264

The Head of Governance
Kenya Breweries Limited
PO Box 30161-00100
Nairobi

25th February 2016

Dear Sir,

REF: REQUEST FOR PERMISSION TO CONDUCT RESEARCH

I am a registered Master's student in the Institute of Energy and Environmental Technology at Jomo Kenyatta University of Agriculture and Technology. My supervisors are Prof. Erastus Gatebe and Mrs. Margaret Kungu.

The proposed topic of my research is **"The role of contractor engagement and training in occupational safety and health performance at Kenya Breweries Limited"**. The objectives of the study are:-

a) To determine the main activities that constitute OSH hazards among workers at KBL.
b) To determine the awareness of OSH measures in place among the workers at KBL.
c) To establish the nature and frequency of accidents/injuries, causes and control at KBL.
d) To evaluate the effectiveness of contractor management programs on OSH at KBL.

I am hereby seeking your consent to progress with this research. To assist you in reaching a decision, I have attached to this letter:-

a) A copy of approval letter issued by the University
b) A copy the research instrument (questionnaire) which I intend to use in my research.

Upon completion of the study, I undertake to provide you with a bound copy of the dissertation should you require one.

Kindly complete the section below as your sign of approval.

Yours sincerely,

John Kimani

PERMISSION GRANTED

Name: BASIL OTIENO Sign:

Designation: HEAD OF GOVERNANCE Date: 29/02/16

Official Company Stamp

KENYA BREWERIES LIMITED
P. O. BOX 30161 - 00100
NAIROBI

Appendix A2: Survey Questions for respondents and consent form

Introduction and consent form

Hello, my name is *John G. Kimani* a student at Jomo Kenyatta University of Agriculture and Technology, pursuing a master's degree in Occupational Safety and Health (OSH). I would like to develop a comprehensive understanding of the safety programs and evaluate the effectiveness of these programs in preventing work-related injuries, ill health and improved OSH performance at Kenya Breweries Limited (KBL).

In line with these objectives, I would like to ask you some questions related to occupational safety and health associated with your work. The information that you will give in this questionnaire will be kept strictly confidential. You don't need to write your name.

Do I have your permission to proceed? Yes ☐ No ☐

Instructions

✍ Sections A to E ask for your thoughts, feelings, opinions, and understanding of the current OSH management programs at KBL and their effectiveness in promoting OSH performance. This survey will take about *10-15 minutes* to complete.

✍ Please respond objectively to as many questions as possible to ensure that the survey results go into enhancing the implementation of better OSH programs at KBL.

✍ Please keep in mind that there is no right or wrong answer for this survey and you can also ask for clarifications in case you do not understand a given question.

SECTION A: Job Category, Work Location or Area of Expertise

In this section, think about your duties, department or area where you spend most of your time working or offering services. Respond to each question by ticking (✓) in the appropriate box.

1. What is the nature of your engagement?

a) Contractor employee ☐

b) Permanent employee ☐

2. What is your gender? a) Male ☐ b) Female ☐

3. What is your marital status?

a) Single ☐

b) Married ☐

c) In a relationship ☐

4. What is your level of education?

Primary ☐ Secondary ☐ College ☐ University ☐

5. Which department do you work in?

a. Manufacturing (Spirits/Brewing/Packaging/Quality) ☐
b. Engineering & Services (incl. Finance & Procurement) ☐
c. Sales, Marketing & Logistics ☐
d. HR & Security ☐

6. How many years have you worked at KBL?

Less than 1 year ☐ 1 to 5 years ☐ 6 to 10 years ☐ More than 10 years ☐

7. How long have you worked in your current work area?

Less than 1 year ☐ 1 to 5 years ☐ 6 to 10 years ☐ More than 10 years ☐

8. How many hours per week do you work?

Less than 20 hours / week ☐ 20 to 39 hours / week ☐ 40 hours /week or more ☐

Section B: Activities that constitute occupational safety and health hazards

In the course of your work what type of hazards are you exposed to and how well are they managed?

1. Physical hazards

Present? (circle as appropriate)			**Well managed? (tick ✓as appropriate)**		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Collision with moving vehicles			
Y	**N**	Working in confined spaces			
Y	**N**	Falls from height			
Y	**N**	Slippery surfaces			
Y	**N**	Dangerous electrical energy			
Y	**N**	Exposure to hot surfaces			
Y	**N**	Exposure to steam			
Y	**N**	Excessive noise			
Y	**N**	Excessive vibrations			

Y	**N**	Pressure extremes			

2. Mechanical hazards

Present? (circle as appropriate)			**Well managed? (tick ✓as appropriate)**		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Crushing			
Y	**N**	Cutting			
Y	**N**	Grinding			
Y	**N**	Drawing in			
Y	**N**	Entanglement			
Y	**N**	Friction and abrasion			
Y	**N**	Impact			
Y	**N**	Shearing			
Y	**N**	Stabbing and puncture			

3. Biological hazards

Present? (circleas appropriate)			**Well managed? (tick ✓as appropriate)**		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Micro organisms			
Y	**N**	Exposure to pathogens			
Y	**N**	Exposure to carcinogens			
Y	**N**	Dangerous pests and insects			

4. Chemical hazards

Present? (circle as appropriate)			Well managed? (tick ✓as appropriate)		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Handling of chemicals			
Y	**N**	Exposure to fumes			
Y	**N**	Exposure to smoke			
Y	**N**	Ionizing radiation			
Y	**N**	Exposure to carcinogens			
Y	**N**	Exposure to fossil fuels			

5. Physiological hazards

Present? (circle as appropriate)			Well managed? (tick ✓as appropriate)		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Poor workstation design			
Y	**N**	Unnatural posture / motions			
Y	**N**	Inadequate lighting			
Y	**N**	Poor ventilation			

6. Psychological hazards

Present? (circleas appropriate)			Well managed? (tick ✓as appropriate)		
			Disagree	**Uncertain**	**Agree**
Y	**N**	Gender harassment			
Y	**N**	Excessive work pressure			
Y	**N**	Lone working			

Section C: Awareness and preventive measures

		Strongly Disagree	Disagree	Uncertain	Agree	Strongly Agree
1	KBL as a company has adequate OSH policies					
2	Employees understand the company's OSH policies					
3	At KBL safety information is visible to all staff					
4	I am aware of all hazards in my workplace					
5	I am always involved in risk assessment					
6	Safety operating procedures are available to all workers					
7	Adequate personal protective equipment is provided to all employees					
8	Safety and health induction training is mandatory for all staff					
9	All staff receive refresher OSH training					
10	The factory has adequate number of trained first aiders					

11	I am aware of accident reporting procedures					
12	I gave input in the design and layout of new equipment					
13	I participate in regular OSH committee meetings and workplace inspections					
14	Dangerous parts of work equipment are adequately guarded					
15	All workrooms are adequately ventilated					
16	My workroom temperature is comfortable					
17	My work station is always adequately lit					
18	Management understands safety and health issues in my work area					
19	Safety is prioritized in all company forums as a standing agenda item					
20	I am strongly encouraged to report unsafe conditions and behavior					
21	I am involved in safety					

	performance goal setting and review					
22	I underwent medical examinations before employment					
23	Regular medical tests are done on employees					
24	I often attend pre-shift safety tool box talks					
25	I know the potential emergencies at my work area					
26	I am involved in regular emergency drills to test preparedness					
27	There are adequate first aid kits and medical services					
28	Employees are aware of safety measures in case of fire					
29	All non-routine, high risk tasks are controlled by permit to work					
30	All plant and equipment is generally well maintained					
31	Plant and equipment undergoes statutory inspections as scheduled					

32	All incidents / accidents are objectively investigated					
33	Learnings from accident investigations are shared with all stakeholders					
34	I am familiar with the company disciplinary procedure					
35	Hazard control measures in place are adequate and effective					
36	There is a continuous review of accident prevention measures					
37	My supervisor always prioritizes safety over other objectives					
38	The safety passport training has helped integrate contractors into KBL family					
39	There is a big gap in contractor and KBL staff safety culture					
40	In my opinion, safety performance has improved over the last five years					

Section D: Nature and frequency of accidents/injuries, causes and control

a) Have you been involved in an occupational accident within KBL?

1. Yes ☐ 2. No ☐

If yes, what type of accident were you involved in? _____

_____

b) Have you been involved in an activity with great potential to cause an accident KBL?

1. Yes ☐ 2. No ☐

If yes, please specify _____

c) Have you been treated for any injury sustained while working at the brewery?

1. Yes ☐ 2. No ☐

If yes, please specify type _____

d) Have you been hospitalized as a result of accident sustained at KBL?

1. Yes ☐ 2. No ☐

If yes, how many days? _____

Section E: Effectiveness of OSH management programs

In your opinion, which of the following programs have been effective in improving OSH performance at KBL? Rate them on a scale of 1 to 5 (*1 being least while 5 the most effective*)

	Program / Effectiveness	**1**	**2**	**3**	**4**	**5**
1	Introduction of contractor safety passport training					
2	Appointment of safety officers and departmental representatives					
3	Scheduled workplace inspections / audits involving all stakeholders					
4	OSH performance goal setting and review in line with zero harm					
5	Regular safety-only meetings between KBL management and contractor directors					
6	Safety performance incentive schemes and recognition					
7	Robust accident / incident reporting procedures and shared learnings through safety alerts					
8	Strict control of non-routine high risk tasks through Permit to Work program					
9	Strict adherence to Safe Operating Procedures and PPE					
10	Robust enforcement of disciplinary framework					

Please write down any other suggestions on how OSH at KBL can be improved.

_____

Thank you for completing this survey.

Appendix A3: Structured interview guide

1. Tell me something about yourself.
2. How long have you been working with KBL?
3. What is your professional background?
4. What safety issues do you encounter in your profession?
5. What safety training programs have attended and successfully completed?

Part B

What is your understanding of the current safety and health engagement forums for contractors/permanent employees at KBL?

1. How often do the person(s) you report to engage you in OSH matters?
2. How important are these forums to your work as contractor/permanent workers?
3. How often do you require the information obtained from these forums in your work?
4. What is the future of occupational safety and health engagement forums for contractors/permanent workers at KBL?

Part C

1. In your own opinion, what are the strong points of the current programs in relation to OSH performance?
2. How effective are these programs in addressing the current safety and health issues at your workplace?
3. How do you perceive the current programs in relation to the safety needs of contractors/permanent workers?
4. How does participating and successfully completing the current safety and health management programs help you in performing your duties?
5. How sufficient are these programs in meeting the H & S legislation in Kenya?

Part D

i. How do you perceive the current safety and health training programs at KBL?
ii. How has training enhanced the way you approach safety and health issues at your workplace?
iii. Has training really worked for you in terms of addressing safety and health issues at the workplace?
iv. What would you do differently if you were involved in the process of developing and implementing safety and health training programs at KBL?
v. What is the future of training programs at KBL?

A. Closing Remarks

Is there anything else that you would like to add that I have not covered in this discussion?

Appendix A4: Observation checklist

The following are some of the things to be observed during the study:-

	Questions	**Yes**	**NO**
1.	Does the site have an adequate number of portable fire extinguishers?		
2.	Are the portable extinguishers located, positioned properly and easily accessible?		
3.	Is there a permit to work procedure for the high risk activities?		
4.	Is there adequate safety information / hazard warning signage?		
5.	Are all employees wearing PPE as required?		
6.	Are the highly risk/electrical rooms/areas restricted to authorized personnel only?		
7.	Are evaluations made through the site to determine that lighting levels are adequate during all shifts?		
8.	Are floor and walking ways clean and orderly free from spillages and obstructions?		
9.	Are cylinders with compressed gages stored upright in specifically designated areas and secured against falling?		
10.	Are there well marked fire exists and fire assembly points?		
11.	Have high risks/noise areas been adequately posted with appropriate warning signs?		
12.	Is there adequate waste segregation?		
13.	Are there adequate and accessible first aid stations		