FACULTY OF SOCIAL SCIENCES

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Approval form:
The undersigned certify that they have read and recommended to the Midlands State University for acceptance a dissertation entitled: **The effectiveness of implementing a Behaviour Based Safety approach in accident prevention. A case study of Delta Beverages, Lagers Manufacturing Company, Harare.**

By

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Abstract

The main goal of the study was to assess the effectiveness of implementing a Behaviour Based Safety (BBS) approach in accident prevention in manufacturing industries of Zimbabwe with focus on Delta Beverages, Lagers Manufacturing in Harare. Causes of most occupational related accidents were identified, Behaviour Based safety measures being taken in accident prevention at Delta Lagers were also taken note of as well as legislative and policy issues related to Behaviour Based Safety. To further establish a robust research, an analysis of relationships identified during the study was employed through chi-square tests. Both qualitative and quantitative methods were employed through the use of questionnaires, interviews and direct observations in order to establish a comprehensive research. The research established that both unsafe conditions and unsafe behaviours largely contribute to occurrence of occupational related accidents but with unsafe behaviours being the greatest contributor. The Behaviour Based Safety measures being taken in accident prevention at Delta Lagers such as issuing of violation forms and offering Safety, Health and Environment incentives have so far assisted in reducing unsafe acts although management support is still lacking in driving these safety related issues. The research also divulged that the legislation of Zimbabwe does not fully incorporate behavioural management as a measure to curb accident occurrence. Thus recommendations brought forward were the need to incorporate behavioural management as a tool to assist accident prevention in the legal framework of Zimbabwe, also the need to formally adopt the Behaviour Based Safety approach in accident prevention at Delta Lagers and for employees to be given the right to refuse to work under unsafe conditions among others.

Acknowledgements

I would like to express my sincere gratitude to the Almighty God who has been guiding and protecting me throughout the course of my degree programme. My greatest appreciation goes to Dr Steven Jerie who has been my supervisor as well as my mentor for his unwavering support, care, patience and guidance. Through his assistance, I have become a better equipped student. I would also like to appreciate the nurturing I have received from the GES staff for the four years I have been at Midlands State University.

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I wish to also thank all the staff members at Delta for the assistance and the support they offered me during the course of my attachment period at the firm and Mr. T Shingirayi for being my Industrial Supervisor. He imparted some valuable mentoring and coaching in the quest to mould me into a complete S.H.E officer and I'm particularly grateful for the advice and the feedback, especially the negative. Special mention goes to my dearest friends Obert Munemo, Trish Mafuku and all the Christian union family members for being supportive and involved individuals. Lastly my special friend Charmaine Ntini for being supportive and encouraging me to pray always.

Dedication

This dissertation is dedicated to my supervisor, Dr Steven Jerie for awakening the academic giant in me, my parents for their unwavering support and love and to all my friends and family for constantly believing in the ability I carry to succeed in my academics.

Acronyms

BBS	Behaviour Based Safety
EMA	Environmental Management Agency
ILO	International Labour Organisation
ISO	International Standards Association
NOSA	National Occupational Safety Association
OHSAS	Occupational Health and Safety Assessment Series
OSH	Occupational Safety and Health
PPE/C	Personal Protective Equipment or Clothing
SHE	Safety Health and Environment
SPSS	Statistical Package for Social Sciences
UK	United Kingdom
USA	United States of America

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

Behaviour-based safety (BBS) refers to a broad category of interventions (e.g., processes, programs, strategies and tactics) in which behavioural psychology principles are applied to change specific behaviours (Gilmore *et al.* 2001). Behaviour Based Safety principles have been used, often in the form of a behavioural observation and feedback process, with considerable success to reduce the occurrence of incidents and injuries, primarily by increasing the frequency of safe behaviours and decreasing the number of at-risk behaviours (Gilmore *et al*. 2001). This approach seeks to understand why employees act in a certain manner when it comes to Safety issues, how their unsafe behaviours put them at risk and what principles can be used to address their unsafe behaviour. The approach also reiterates the need to have management commitment for it to be successful.

In 1979, Dr. Tom Krause, a psychologist, and Dr. John Hidley, a physician, founded Behaviour Science Technology and pioneered the application of behavioural methods in industrial settings with emphasis on practical issues facing managers charged with implementing this approach which later widely accepted as Behaviour Based Safety (Behaviour Based Initiatives 2012). Behaviour Based Initiatives (2012) also explains that the integration of best practice methodologies with practical experience resulted in the Behavioural Accident Prevention Process technology. (Behaviour Based Initiatives 2012) goes on to explain that sites that adopted this approach when it was introduced saw an average reduction of 25%+ in recordable injuries in year 1 with continued reductions in subsequent years.

Historically, organisations around the world have relied on providing workers with safe tools, equipment and machines, good housekeeping, safe engineering and good management systems (Gilmore *et al*. 2001). Although these promoted a safe environment, it however produced marginal gains. Thus some organisations in the world have begun to focus on implementing a Behaviour Based Safety approach in order to minimise the occurrence of accidents. In Africa, countries such as South Africa were amongst the first to adopt a Behaviour based safety approach in accident prevention. According to (Mining Safety 2015) Safripol industry which manufactures plastics in South Africa has a work force of 450 including contractors and has seen a consistent reduction in injuries since implementation of an effective behaviour-based environmental health and safety programme. Zimbabwe has equally begun to adopt the

Behaviour based safety approach with industries such as Delta Beverages adopting the approach. Employees are encouraged to caution each other whenever one violates a safety procedure and this is helping in reducing unsafe acts at the workplace.

Human error accounts for 88% of industrial accidents, which means that modifying human behaviour is one of the most effective ways of improving workplace safety (Mining safety 2015). This shows why accidents continue to occur in industries because the behaviour of employees is not being dealt with. Accidents continue to occur with alarming regularity world wide despite improvements being made in the work environment to reduce accidents. According to (ILO 2013) accidents that happen due to Occupational related injuries in the world are continually increasing. The statistics from (ILO 2013) indicate that 2.02 million people die each year from work-related diseases whilst 321,000 people die each year from occupational accidents. An estimated 160 million non-fatal work-related diseases are also recorded per year whilst 317 million non –fatal occupational accidents per year. This means that every 15 seconds, a worker dies from a work-related accident or disease.

Every 15 seconds, 151 workers experience work-related accidents (ILO 2013). Furthermore the continent of Africa experiences more than 54 000 occupational related injuries annually (Boniface *et al.* 2013). When we take the issue home, According to NSSA(National Social Security Authority) statistics, at least 5491 people were injured and 34 died due to work related incidents in 2014 (Katongomara 2014). They were 33 deaths and 5666 injuries during the same year ago period. In 2012, 107 fatalities against 5141 injuries were recorded, with 16 298 injuries being recorded in the last three years. Based on these statistics, it can be concluded that there is need to introduce better ways of promoting a safe work environment through both employee and managerial involvement. This study thus endeavours to justify the effectiveness of implementing a behaviour based safety programme in accident prevention.

Gilmore *et al* (2001) postulates the vast majority of incidents and injuries share the at-risk behaviour as the common denominator which behaviour based safety seeks to address. Behaviour based safety programmes are based on the ABC principle of Antecedent factors that trigger Behaviour, followed by Consequences. Antecedents are the key factors that influence behaviour before it takes place, and should encompass company safety requirements. Behaviour is repeated, or reinforced, when the consequences are favourable. The ultimate goal of BBS is to turn required behaviours into habits as highlighted by (Mining safety 2015). For

this programme to be successful there should be total by in and commitment from top management, the employees as well as contractors.

No matter how safe the work environment is made to become, how many times people are trained and how much we enforce compliance, there is still need to deal with the uncertainty of human behaviour to minimise accidents (Gilmore et al 2001). The Behaviour Based Safety approach seeks to understand what caused an employee to react in a certain way that is not safe and it is that behaviour that needs to be addressed. Thus it is essential to consider implementing a behaviour based safety approach in minimising accidents at Delta Lagers.

1.2 Statement of the problem

The problem that is currently being faced in the world at large in occupational safety and health issues has to do with an increase in number of accidents at the workplace. Most of these accidents are said to be caused by human error. (Construction Owners Association of Alberta 2012) reiterates that analysis of incidents worldwide shows that +/- 90% of them have the behaviour of the person(s) involved as a key contributing factor. In February 2013, The International Labour Organization (ILO) called for an "urgent and vigorous" global campaign to tackle the growing number of work-related diseases, which claim an estimated 2 million lives per year (ILO 2013). In light of these statistics, Zimbabwean industries, have not been spared from these work related accidents attributed to human error, Delta Lagers included.

The causes of accidents at Delta Lagers range from employee operating at unsafe speed, inadequate inspection programme, employee not paying attention to hazard and practically just working on moving equipment among others. Added to this the organisation has scant if any records to divulge that it has identified that most of these accidents are due to human error. Efforts are being made however to indirectly deal with the behaviour of the employees but there has been little commitment from management thus the organisation has so far attained marginal gains. The unsafe behaviours need to be reduced if progress is to be made in accident prevention. (Construction Owners Association of Alberta 2012) postulates that increasing the number of safe behaviours being performed is essential for incident elimination.

In order for a behaviour based safety approach to be successful, top management should also be committed. In light of this, there has not been much commitment from top management to improve employees' safe behaviours at Delta Lagers. The great concern is to meet beer targets and employ cost cutting measures at the expense of the safety and health of workers. Very little efforts are made to encourage employees to record occurrence of incidents and to merely

release employees to attend trainings that will help improve their safety behaviours. Williams (2008) explicates that optimizing management support for safety is a key ingredient for safety culture improvement and the further reduction of injuries. The research thus seeks to establish strategies that can be used to implement a behaviour based safety approach in accident prevention at Delta Lagers.

1.3 Objectives of the study

General objective of study

- To assess the effectiveness of implementing a behaviour based approach in accident prevention at Delta Beverages, Lagers Manufacturing.

Specific objectives

- To identify the causes of accidents at Delta Beverages, Lagers Manufacturing.
- To assess the effectiveness of behaviour based safety measures being taken in accident prevention.
- To come up with a sustainable behaviour based safety programme for accident prevention.

1.4 Justification

This study is vital in that it will establish facts that can be used to adopt a sustainable behaviour based safety approach which will assist in accident prevention at Delta Lagers and ensure a sustainable safety management strategy. The Behaviour based safety program has proved to be progressive in the industries that it has been introduced like Safripol in South Africa. It is thus important in industries like Delta Lagers as it will assist in promoting safe behaviours leading to reduced accident occurrence. Behaviour Based Safety encourages employees to be conscious of their surroundings and work safely and along with that it will be minimising unsafe acts which equally reduce accidents.

The study is also justified as it seeks to enhance the control of accident occurrence onto the already existing coping strategies at Delta Lagers. If the measures that are already being used are coupled up with behaviour based safety, much progress is made. Behaviour based safety approach is also justified because it is a proactive process that helps to get changes in a work group's safe behaviour levels before incidents happen and it seeks to change the person's mind set, habits and behaviours so that these "at risk" behaviours will no longer be performed

(Construction Owners Association of Alberta 2012). These research findings and recommendations are going to benefit the employees, Delta Lagers organisation, Researchers, NSSA as well as the government. The recommendations will assist in reducing the occurrence of accidents at Delta and this will equally help to reduce medical costs associated with these accidents for Delta Lagers.

Reduced accidents will also enhance the public image of the organisation as most companies today want to do business with organisations that have good Occupational Safety and Health management systems. The company will not have to pay large sums of money to retrain employees who would be replacing those who would have become the victims of these work related accidents that lead to death or disability. Employees benefit in that they work safely and will not have to lose their income due to permanent or temporary incapacity which will not allow them to continue working. NSSA will also be at an advantage as it will not have to folk out much money on compensation schemes to those involved in accidents that lead to disabling injuries and to families who would have lost their loved ones. The research findings, if fully implemented will also benefit the government in reducing medical costs that are incurred from these work related accidents. Researchers' knowledge across the globe will also be enriched with the findings from this study. It is from this justification that I have decided to study on the implementation of a behaviour based safety approach to reduce accidents at Delta Lagers.

1.5 Description of Study area

The area that is going to be under study is Delta Beverages, Lagers Manufacturing. Delta Lagers plant is located in the Southerton area along Manchester road. Southerton is in Harare, which is the capital city of Zimbabwe. Harare is situated in the north eastern part of Zimbabwe, and it lies on a high-lying plateau. It is set above the lowlands of the Zambezi River in the north and Limpopo River in the south (Maps of world 2015). The city enjoys a warm, wet summer season from November to April, a cool dry winter season from May to August and a hot dry climate in September and October. Its annual average temperature is 18.4 degrees Celsius and average annual rainfall of 805.2mm. Sotherton's geographic co-ordinates are 17° 51' 49" South, 31° 1' 9" East. The geographic co-ordinates for Delta Lagers are 17° 52' 15S and 31° 00' 1". Industries that are in close range with Delta Lagers include Pharmanova and the British American Tobacco industry among others. Delta Lagers manufactures Lager beers, draught beer and carbonated soft drinks which include fanta, sprite and coke among others. This plant comprises of two distinct sections namely the Lagers section and the Sparkling Beverages (SBs) section which are both in the Packaging Department. Other departments found at Lagers

include Warehouse, Brewing, Engineering and Finance and Administration. The organisation has an average of 700 workers. The project thus seeks to assess the effectiveness of implementing a behaviour based approach in accident prevention at this organisation, Delta Lagers.

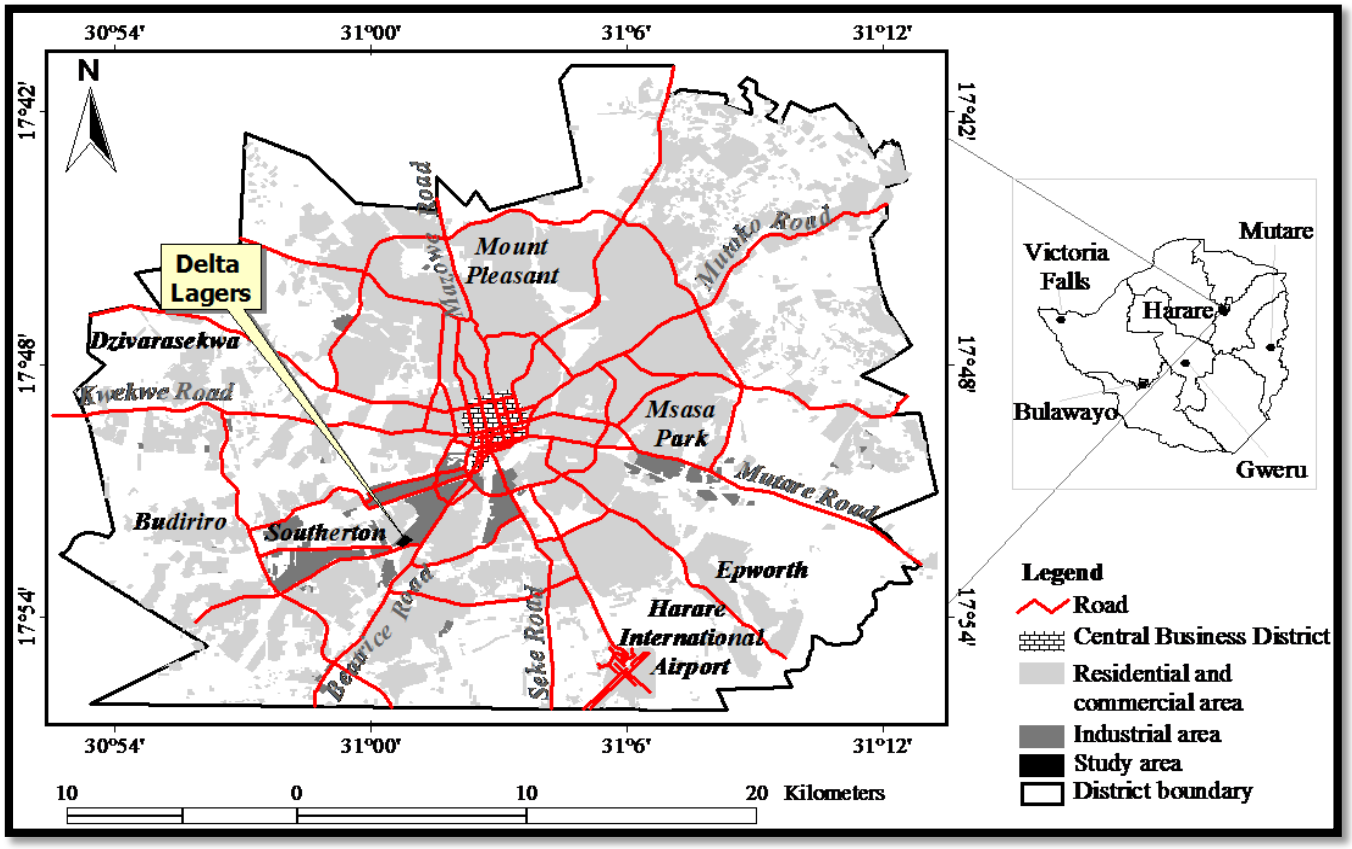


Figure 1.1 A map showing study area

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The main objective of this chapter is to unravel information that has so far been gathered by various scholars around the globe pertaining to behaviour based safety. It brings to light issues such as what behaviour based safety is, how behaviour is related to accidents how it can be employed in an organisation as well as the knowledge gap which seeks to elucidate areas in which the research has not been fully explored. In a nutshell the chapter will bring out previous findings on behaviour based safety which has assisted the researcher in conducting her research.

2.2 Defining Behaviour Based Safety

The behaviour based safety approach was originally developed in the USA and has become a popular way of managing the people side of safety (Clancy 2010). Behaviour refers to those actions that are measurable such as sleeping on duty or jumping over a moving conveyer. Safety is freedom from unacceptable risk or harm. As injuries continued to increase in industries, it was noted that making available hazard free facilities and safe equipment was not sufficient in accident prevention as such the focus was shifted to dealing with the behaviour of individuals. In 1979 Dr. Tom Krause, a psychologist, and Dr. John Hidley, a physician developed behavioural science technology which involved pioneering the application of behavioural methods in industrial settings with emphasis on practical issues facing managers charged with implementing this approach which later widely accepted as Behaviour Based Safety (Behaviour Based Initiatives 2012).

From this behaviour science technology came the now widely accepted Behaviour based safety. Various definitions have been drawn by various scholars. (Gilmore *et al*. 2001) elucidates that Behaviour-based safety (BBS) refers to a broad category of interventions (e.g., processes, programs, strategies and tactics) in which behavioural psychology principles are applied to change specific behaviours. As the years passed by more definitions sprouted. Kaila (2006) expounds that Behaviour Based Safety is a data driven decision-making process which emphasizes that employees need to take an ownership of their safe as well as unsafe behaviours. A more concise and practical definition was further brought forward when behaviour based safety was defined as initiatives that include having line workers observe the behaviour of fellow workers, logging near-miss incidents and devising modest recognition programs by

(Greene 2009). This definition brings to light what in particular is employed when implementing a behaviour based safety approach in accident prevention.

Behaviour based safety is employed through encouraging employees to observe one another using a checklist created by the company and provide feedback on their safety perfomance. Employees ought to do this in a manner that is respectful. Williams (2005) supports this when he says that this peer-to-peer conversation (not confrontation) is instrumental in changing at-risk work practices as well as reinforcing safe behaviours. Safe behaviour calls for an acknowledgement or reward to employees who would have employed it and the at risk behaviour calls for corrective feedback which should be presented in a respectful manner. The organisation has to keep a record of the observation checklists in order to track the progress of the Behaviour based safety programme.

Management ought to be fully involved in the implementation of the program for it to be a success. Williams (2008) postulates that optimizing management support for safety is a key ingredient for safety culture improvement and the further reduction of injuries. It is therefore fundamental to note (or be reminded) that Behaviour based safety is a programme that encompasses both the employer and the employee working together to reduce injuries and deaths at the workplace through managing how people act at the work place. Thus Behaviour Based Safety focuses on what people do, analyses why they do it, and then applies a research-supported intervention strategy to improve what people do.

2.3 Traditional Safety

Historically, the safety and health of employees was mostly focused on merely providing a safe work environment and providing employees with safe tools and equipment in order to reduce the occurrence of occupational accidents and deaths. (Gilmore *et al* 2001) postulate that providing hazard-free facilities and providing better tools and equipment have, understandably, worked well to improve safety. However despite providing such an environment, occupational injuries and deaths continued to increase with alarming regularity and they were no marginal gains that were attained. This type of safety culture was characterised by simply providing employees with personal protective equipment, handing out lock out or tag out procedures and providing conveyers with machine guards to mention but a few. Follow up to see if employees are working safely was close to nil.

The problem that sprouted from this approach was that despite being provided with personal protective equipment like welding helmets, other employees still did not wear the helmets when

welding. Reasons varied from the PPE being uncomfortable to simply not knowing the danger inherent in welding without a welding helmet. This approach is still evident in organisations whose safety culture has not matured. In this light, organisations had to devise much better strategies of reducing accidents in industries and this saw the behaviour based safety approach being introduced. Perdue *et al* (2007) supports this by stating that we have come to realize that people are not perfect and will make mistakes despite their best intentions and working in the best of surroundings and as such the behavioural approach was developed to focus on reducing hazards.

2.4 Nature of accidents in industries

An accident is an unplanned or unintended event leading to damage, injury or death. When dealing however, with accidents in industries, they are referred to as occupational accidents. By definition, occupational accident is an unlooked for mishap or untoward event or process of work arising out of and in the course of a worker's employment, which was not expected or designed by the worker and which results in injury to him (NSSA 1990). The same term is also defined by (Jovanović et al 2004) as an unexpected and unplanned occurrence, including acts of violence, arising out of or in connection with work which results in one or more workers incurring a personal, disease or death.

The impacts of accidents to families and organisations are devastating ranging from staggering costs in terms of loss of life, pain and suffering, lost wages for the injured worker, damage to production facilities and equipment to loss production opportunity as according to (Jovanović *et al* 2004). The nature of accidents is classified according to the type of injuries. The injuries vary from fatalities, disabling injuries, minor injuries to first aid cases.

2.5 Causes of the accidents

According to the domino theory, 88% of all accidents are caused by unsafe acts of people, 10% by unsafe actions and 2% by "acts of God" (Jovanović *et al* 2004). These accidents arise as a result of a plethora of hazards present at the work place. Table 2.1 gives an illustration of hazards found at the work place.

HAZARD TYPE	EXAMPLES
Physical	noise and radiation
Chemical	chemical disinfectants
Biological	pathogens
Environmental	Lack of skills

Table 2.1 Hazard type and example

These hazards determine the dangers that an employee will be exposed to. However ultimately unsafe behaviour and unsafe conditions are the major causes of accidents at the work place. Magyar (2006) supports this by saying accidents are the result of human error, and they involve unsafe behaviour or an unsafe condition, or a combination of both.

2.5.1 Unsafe conditions and Dangerous equipment

An unsafe condition is a condition in the work place that is likely to cause property damage or injury (Lagrandeur 2013). Unsafe conditions include machines without guards which largely contribute to injuries that occur due to entanglements and loss of fingers, poor lighting which reduces visibility, poor floor condition such as slippery floors, defective vehicles such as vehicles with oil leaks or a defective horn and absence of safety signs. The absence of safety signs especially puts employees in a precarious position as it forces them to venture into certain jobs and acts without knowing the inherent dangers. Other unsafe conditions include defective machines such as conveyers that constantly jam and working on machines that are not secured tightly.

Defective conveyers pose a threat of trapping the worker leading to either body or hand injuries. Poor housekeeping is another unsafe condition leading to accidents. Gordon (2014) elucidates that housekeeping is one of the most accurate indicators of the company's attitude towards production, quality, and worker safety and a poorly kept up area leads to hazards and threats everywhere. Poor housekeeping sets the stage for tripping and falling hazards. Congestion in the workplace is another unsafe condition which results in accidents as highlighted by (Lagrandeur 2013). Congestion limits working space and employees become more susceptible to occupational injuries and accidents. Provision of personal protective equipment is key in protecting the health of employees, however, another unsafe condition is created when employees are not given the required personal protective equipment for their tasks. To exemplify this, working in a dusty condition without dust masks puts the employee at risk of contracting respiratory diseases. Thus without adequate and appropriate personal protective

equipment employees are exposed to hazards which are highly detrimental to their health. Unsafe conditions do not work in isolation in causing accidents, unsafe behaviour of employees also comes into play as will be highlighted below.

2.5.2 Behavioural causes (unsafe acts, at risk behaviour, poor decisions)

The majority of workplace accidents are caused by human factors rather than by machine faults, making safety consciousness, training and procedures the key element in promoting safety at work (NSSA 2012). Some of the behavioural causes of accidents include operating machinery at unsafe speed, working without adequate personal protective equipment, ignoring a safety procedure, taking shortcuts, using defective equipment, not paying attention to a hazard, making safety devices inoperable, operating machinery without authority and negligence by management. These are explained in detail below.

Operating machinery at unsafe speed is risky behaviour. By speeding drivers believe that they can save a lot of time and avoid the consequence of getting a speed ticket. This risk is normally faced by truck drivers working in industries. Another reason is that when driving other drivers will also be engaging in the same at-risk behaviour, implicitly encouraging the driver to continue speeding (Perdue *et al* 2007). Moreover, employees in most organisations, despite being given personal protective equipment, decide not to wear the PPE. The reasons for not wearing vary from PPE being uncomfortable to basing on the fact that work experience tells them they have worked without it and have not been hurt. Typical example is an increase in the number of accidents occurring due to bottle bursts which have not been contained at Delta Lagers, Harare which is the case study area for this research. Actions to wear face shields to protect the face from injuries have been drawn but employees seem not to really see the importance of these as they continue to work without them anyway. This is an at risk behaviour

Employees in industries normally find themselves working under pressure so as to meet set targets by managers and supervisors resulting in them working unsafely by taking shortcuts. Gordon (2014) explains that when workers take shortcuts at work, especially when they are working around dangerous machinery or lethal chemicals, they are only exposing themselves to a potential catastrophe. Negligence by management also puts employees at risk of being involved in accidents. The situation in industries according to (Frederick and Lessin 2000) is such that workers are often rewarded for performing tasks in an at-risk manner because doing so is typically faster, easier, more comfortable, and more efficient or convenient than following the safe procedures. This has seen workers being involved in accidents. In one accident

investigated at Delta Lagers, an employee agreed to have gotten injured while in a hurry to finish his task as pressure was being put on him by the Supervisor to finish on time.

Ninety-five percent of accidents due to human factors can be blamed on inadequate supervision or management of safety issues (NSSA 2012). In other instances employees are aware of the hazards associated with their type of work but generally decide to not pay attention to them and rather use their experience. This is manifested when employees ignore safety procedures or regulation putting themselves at great risk of being involved in accidents. Casual attitudes about safety can result in a casualty (Gordon 2008). The effects of such irresponsible behaviour are detrimental. As such from this background it is critical that behavioural change interventions be introduced in a way that will have a positive impact on the overall safety culture at the work place. This greatly assists in minimising accidents as most accidents in the workplace are being attributed to human behaviour.

2.6 Activators and consequences influencing behaviour (ABC Analysis)

ABC stands for Activator, Behaviour and Consequence. An activator sets the stage for the behaviour, behaviour refers to those actions that are measurable or observable and consequence is the positive or negative outcome that result from taking certain actions. This model or analysis helps us to understand why employees behave in a certain way and is thus used to explain factors that influence the unsafe behaviour displayed by employees at the work place. Figure 2.1 illustrates the analysis;

ABC Model

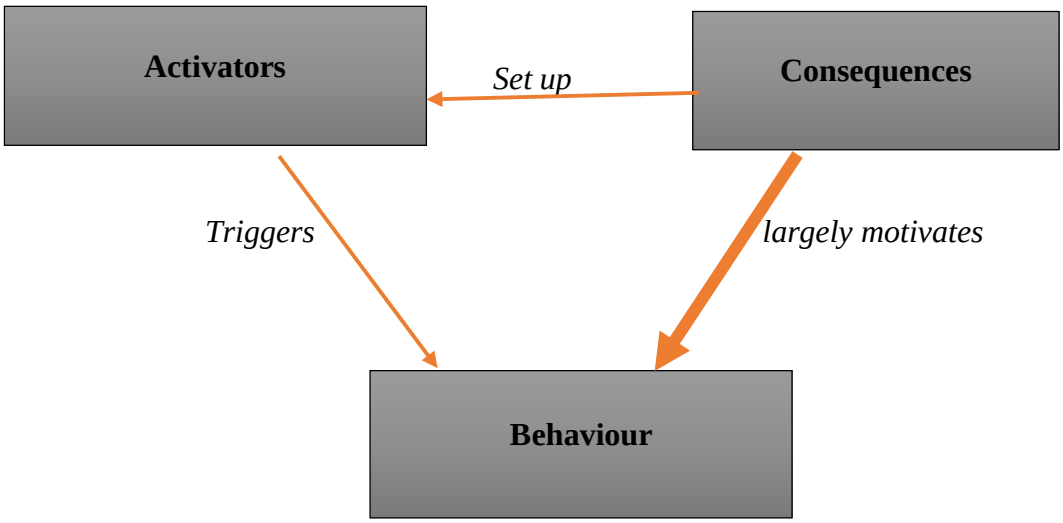


Figure 2.1 ABC model

Fleming and Lardner (2001) elucidate that this model states that behaviour is triggered by a set of antecedents and the likelihood that a behaviour is repeated is dependent on the consequences following the behaviour. Activators and consequences can either encourage or discourage an employee to work safely or unsafely thus influencing behaviour as illustrated in the diagram. Activators such as providing employees with personal protective clothing, conducting safety meetings which highlight why employees should work safely and posting safety signs among a plethora of other factors assists employees to be safety conscious. Added to this positive consequences that arise from following safety procedures such as reduced injuries and occupational related diseases can influence safe behaviour amongst employees. However this is not just one way, there are also other activators that promote unsafe behaviour such as lack of availability of personal protective clothing, working under pressure and absence of management support in safety issues. With this comes negative consequences such as a continued increase in occupational related injuries and deaths.

It is of importance to note however that consequences and activators do not work in isolation but factors such as *probability, timing and significance* also come into play in influencing behaviour. One can therefore not fully establish that if employees are given adequate PPE, they will use it appropriately. To exemplify, in bottling industries, employees working in a department where there are constant bottle bursts face the consequence of sustaining lacerations and this encourages them to wear face shields. On the other hand employees perceive that a face shield is uncomfortable and thus not wearing it provides them with better vision and comfort and this consequence encourages them not to wear their head gear. The employees' experience in the department cause them to believe that the *probability* of being cut is low as they have not experienced as many related incidents and wearing a face shield lowers their perfomance causing them to not save time*(timing).*

This becomes personally *significant* to the employee as they perceive to save much time immediately. In reality however, the *probability* of sustaining a cut is high as no one controls the occurrence of such an event and the effect is immediate (*timing*) and *significant.* (Gilmore *et al* 2001) insinuates that daily, employees are faced with similar decisions to perform safe or at-risk behaviours and understanding why a risky behaviour occurs can help design effective interventions that can encourage employees perform the behaviour safely. Thus the ABC analysis is key in coming up with interventions to promote a safe work environment. It can be

said to be the anchor of behaviour based safety as it helps establish why employees behave in a certain way. This leads us to the observation and feedback process for behaviour based safety.

2.7 Behavioural observation and feedback

Behaviour-based observation and feedback processes focus on the at-risk behaviours to identify the root causes that influences the at-risk behaviour; the processes are not intended to blame the employee (Perdue *et al* 2007). The employees are given a task to observe one another using a checklist. The observer then gives feedback to the observee after reviewing his/her observations and this is done in a respectful manner. Unsafe behaviour is given corrective feedback whilst safe behaviour is applauded. Results are compiled so as to keep track of areas in need of attention. A rather comprehensive description of this process follows.

2.7.1 Design of process, implementation and feedback

A cross-organizational Implementation Team (IT) comprised primarily of production-level employees, but including sufficient management representation, should be used to oversee the design, implementation, and administration of the process (Gilmore *et al* 2001). The team receives comprehensive training which includes BBS process development (e.g., creating an observation card, determining rules for using the card, defining roles and responsibilities of key groups to make the process successful) (Williams 2008). This team in turn trains other employees on behaviour based safety principles and on how to conduct the observation and feedback process. The training is conducted to ensure that employees have an appreciation of the importance of implementing a behaviour based safety approach. As such, employee perceptions regarding the quality and relevance of BBS training received may have great potential for determining the frequency and quality of involvement in a BBS process (Geller and DePasquale 1999). The team is thus fundamental as it assists to steer up the behaviour based safety program.

2.7.2 Behavioural checklist use and analysis

The Implementation Team develops the initial generic checklist, by examining several sources, such as injury and near miss reports, and job safety analyses and it selects the most important categories of behaviours (usually 5-7 categories) they think are most critical and includes them on the checklist (Perdue *et al* 2007). Within each of these categories, specific behaviours to be observed are listed. For example body positioning might be selected as a category and it might include behaviour such as cramped, lifting and ergonomics with columns to tick safe or unsafe. The Team also states the demographic data to be included such as date, observee and time.

Another fundamental issue is to establish systems to determine how information from the observations will be analysed, compiled and shared with employees as well as developing intervention strategies to close gaps identified.

2.7.3 Conducting the physical observation and feedback

Once the implementation team is satisfied that all employees have been trained, the observation process begins. The Implementation teams makes clear the roles and responsibilities of the employees in ensuring the success of the process. Observers are selected and they are given behavioural checklists which they will use whilst observing. Once they observe the employees, they ought to give feedback in a respectful manner. Williams (2005) explains that this peer-to-peer conversation is instrumental in changing at-risk work practices as well as providing formal opportunities for employees to compliment one another for completing tasks safely. He further goes on to say that the feedback allows the observer and observee to analyse tasks together to identify and remove any barriers to safe work performance such as uncomfortable or inconvenient PPE or ergonomically incorrect equipment layout. Data collected from the checklists is then analysed and complied and work teams draw up intervention strategies. To follow up on areas that require attention, a DO IT process is applied and this is D-Define, O-Observe, I-Intervene, T- Tests. William (2008) explains that the implementation team works with hourly (and other) employees to develop interventions to improve the defined behaviours, then tests whether the interventions worked. If no changes are noted, other interventions are brought up until the intended goal is met.

2.7.4 Sustaining the Behaviour based safety process

Once the behaviour based safety program is introduced, there is need to sustain it. This is primarily so because at first employees might be sceptic about the program and not very much co-operative resulting in their cynicism wearing out or discouraging the Implementation team. There is therefore need to diligently sustain this approach. According to (Clancy 2001) some of the ways, among others, of sustaining the process include to start “small” and allow employees time to get used to an observation and feedback process before adding too much complexity, aligning the program with current systems and processes of an organisation, demonstrating returns on investment and incorporating key performance indicators associated with the program into management performance appraisals. Demonstrating returns on investment is especially important because it encourages the employees with a positive attitude towards the approach and thus yielding even more returns.

Other ways of sustaining the behaviour based safety system include updating the observation checklist often, conducting BBS trainings for all employees, to make sure that supervisors do more observations and for managers to give feedback on issues raised during the observation process so as to boost employee morale. Added to this an organisation can periodically bring in external auditors to evaluate the effectiveness of the behaviour based safety process. Again, the Implementation team ought to periodically track progress on interventions that would have been suggested from observations conducted by employees to ensure that necessary corrective actions are being taken and the behaviour of employees is transforming. These strategies among others can greatly assist to sustain the behaviour based safety program.

2.7.5 Management involvement

Managers play a crucial role in developing and maintaining an ideal safety culture (Geller, 2008, 2005, 2002) in (Williams 2005). The success of a behaviour based safety program largely depends on the involvement of management. Management involvement displays a sense of importance in terms of safety matters and as such employees are keener to co-operate. This co-operation greatly helps to reduce injuries at the work place. Managers may inadvertently encourage at-risk behaviour through failure to reinforce a safe behaviour, failure to coach an at-risk behaviour, reinforcing production more than (or instead of) safety and modelling at-risk behaviours (Williams 2008).

Ways in which managers model at risk behaviour include displaying risky behaviour such as operating machinery at unsafe speed or not wearing adequate and appropriate PPE where it's required. This equally increases unsafe behaviours among employees who in turn develop a rebellious attitude resulting in a situation in which safety issues are regarded as unimportant. It is fundamental to have full and total support from management if organisations are keen to reduce occurrence of accidents.

In this light, management ought to actively interact with shop floor workers so as to be aware of their safety needs. Moreover, problems raised should be addressed timeously and proper communication should be made to employees in instances where certain issues might take longer than expected to be rectified. Added to this management should ensure that adequate PPE and a safe working environment is provided to employees. Furthermore management should ensure that workers do not work beyond their normal hours and if they do, a provision of an overtime allowance should be put in place. In this light, it is of essence to note that

management involvement is key in fulfilling the goal of accident reduction at the workplace and ensuring the success of the behaviour based safety program.

2.8 Critical successes derived from the Behaviour based safety approach

According to (Fleming and Lardner 2001) successes derived from the Behaviour based safety approach include the ability to decrease accidents / injuries, ability to increase safe behaviour and the approach helps to establish which components in a behavioural safety programme are most important in changing unsafe behaviour and reducing accidents and injuries. The programme thus helps an organisation to identify unsafe acts and eliminate them through observation and feedback and as such the number of accidents is decreased.

Reduced accidents also enhance the public image of the organisation as most companies today want to do business with organisations that have good Occupational Safety and Health management systems. The Behaviour based safety program will thus assist to also reduce medical costs associated with accidents. Moreover Behaviour based safety has proved to be progressive in the industries that it has been introduced like Safripol in South Africa (Sam 2014). Positive results have also been obtained in many sectors of the UK, Irish and US economies, such as Construction (Duff *et al*., 1993), manufacturing (Cooper et al., 1994) cited in (BSMS 2016). In summation BBS enhances the reputation of an organisation and improves the company's public image . It also enhances the productivity of a company and reduces insurance premiums as well as ensuring that progress is made in safety and health management.

2.9 Knowledge gap

Behaviour based safety has been researched for almost five decades now since the 1970s. Studies have so far identified what BBS is, how it is implemented and sustained, successes that are derived from it and case studies showing how the process has been implemented in other organisations have also been made available especially in the continents of Europe and America. This research, however, has not been fully explored in Zimbabwe as well as in the whole of Africa. There is not enough data to show organisations that have employed this programme with successes and the trends that show reduction in accidents experienced. Moreover, in Zimbabwe, due to limited data on the subject of behaviour based safety, the effectiveness of implementing and sustaining it has not been made known to organisations and the population at large. Main reason for this could be that our safety culture has not yet matured enough. Primary aspects such as offering Personal Protective Equipment are still a major problem in Zimbabwe. On a different note however, Murowa diamond in Zimbabwe is amongst

the few organisations in Zimbabwe that have made it known that they have implemented the behaviour based safety program with some successes but data on the implementation of the program has not been , made available to the public. This study therefore seeks to identify the causes of accidents at Delta Beverages, Lagers Manufacturing, to assess the effectiveness of behaviour based safety measures being taken in accident prevention and to come up with a sustainable behaviour based safety programme for accident prevention and provide the information to the public.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the research design used to collect and analyse data collected pertaining to the effectiveness of behaviour based safety in accident prevention at Delta Beverages, Lagers Manufacturing. The research is descriptive and analytical whilst employing the qualitative and quantitative approach and embracing the positivist and phenomenological philosophies. The discussion will entail issues to do with sample selection, methods of data collection, target population, data analysis and ethical issues.

3.2 Research design

The research design refers to the overall strategy that you choose to integrate the different components of the study in a coherent and logical way, thereby, ensuring it effectively addresses the research problem. It constitutes the blueprint for the collection, measurement, and analysis of data (University of Southern California Libraries 2015). A descriptive study was undertaken at Delta Lagers to gather information in regard to the effectiveness of behaviour based safety in accident prevention. It is pertinent to note that they were instances in which the student employed an analytic research and hence both types of research worked hand in glove in order to come up with a coherent study. According to University of Southern California Libraries (2015) a descriptive research design helps to provide answers to the questions of who, what, when, where, and how associated with a particular research problem and it cannot conclusively ascertain answers to why. The analytic research answers the why question. Use of both types of research provides a vivid understanding on how behaviour is related to accident occurrence.

Triangulation of both qualitative and quantitative approaches was used in the study. Qualitative research is about recording, analysing and attempting to uncover the deeper meaning and significance of human behaviour and experience, including contradictory beliefs, behaviours and emotions (Alzheimer Europe 2013). In this case it was about information on the causes of accidents, the behaviour of employees that is leading to accidents, management of the behaviour based safety approach, how addressing this behaviour helps to minimise accidents and legislation and policy issues. The techniques that were used included administering questionnaires, interviews and field observations. These were directed to Delta Lagers

employees. The techniques were effective in understanding the perceptions and views of employees on what mainly causes accidents, the role played by behaviour in causing accidents and the effectiveness of a behaviour based safety approach in accident prevention. Quantitative technique was also employed in situations that required statistics especially accident statistics. An interview with the SHE Manager was employed in order to gather the required statistics. These helped in establishing the relationship between the at risk behaviour and accident occurrence.

A research philosophy can be defined as the development of the research background, research knowledge and its nature (Saunders and Thornhill, 2007) in (Dissertation help services 2014). The positivist and phenomenological research philosophies were used in this study. The positivism philosophy is the quantitative objective philosophy which deals with observations and experiments to collect numeric data. The phenomenological philosophy is qualitative in nature. It encompasses collecting views of employees on how behaviour affects accident occurrence through administering questionnaires. All the methods that were employed above complimented each other and assisted in coming up with a robust research.

3.3 Population Sample

Population sample refers to the number of people needed in establishing certain generalizations. In this research the population sample was made up of shop floor workers, the Line Managers, SHE Manager and the Clinic staff. Not all employees were chosen for the survey. 10% of the whole population bulk was used from every department as the sample size as the organisation holds up to 337 people in the departments that were under study. Brewing has 58 people, Packaging has 139 people, Engineering and site services has 82 people whilst Warehouse has 57 people. Thus 10% of the population was picked from each department.

3.3.1 Target population

According to (Explorable.com 2009) Target population refers to the entire group of individuals or objects to which researchers are interested in generalizing the conclusions. This target population is crucial because information should be collected from people who are directly affected by the situation under study to avoid bias. It is this population that will assist the researcher in finding the sample size and the relevant techniques to be used. When selecting the population sample, the departments that are affected by the study are most important as well as what the people in those departments do. Stratified random sampling was employed. This ensures that data collected is accurate and relevant to the study in question.

In this instance, the target population included shop floor workers as well as the line managers. The shop floor workers are crucial as they are the ones directly involved in accidents. The shop floor workers and managers selected for the population sample were positioned in the departments which include Engineering, Site service, Brewing, Packaging and Warehouse. The SHE Manager was also part of the population sample. 10% of the whole population bulk was used from every department as the sample size as the organisation holds up to 337 people in the departments that were under study. Brewing has 58 people, Packaging has 139 people, Engineering and site services has 82 people whilst Warehouse has 57 people. Thus 10% of the population was picked from each department.

The clinic nurses were targeted because they directly treat employees involved in accidents and with their experience they know and understand how behaviour of employees is related to accident occurrence. The SHE Manager and other line managers are actively involved in accident investigations and are well versed with different accident causes and they are responsible for introducing strategies that can be taken to minimise accidents based on the behaviour of employees. They understand why workers behave in a certain way based on their experience with them. Overally the population sample can be said to have been all encompassing as it had employees and managers from various departments.

3.4 Methods of data collection

The primary and secondary data collection methods were employed in the research. The primary data collection methods used included questionnaire, interviews and field observations. Secondary data was collected from the internet, textbooks, newspapers and documents from Delta Beverages Safety Health and Environment department. Questionnaires were administered to 10% of the population bulk by use of stratified random sampling. Interviews were conducted to Line managers, SHE Manager and clinic sister.

3.4.1 Questionnaire surveys

According to Food Aid Organisation (1997) questionnaires are forms which are completed and returned by respondents and are an inexpensive method that is useful where literacy rates are high and respondents are co-operative. It presents those that will respond with questions that are relevant to the study. Open-ended and closed ended questionnaires were employed in this study. Open ended questionnaires have got the advantage that they permit free responses that should be reloaded in the respondent's own hand. They are also useful for gathering facts for which the researcher is not familiar for opinions, attitudes and suggestions for people.

Questionnaires were also employed so as to collect both qualitative and quantitative data. Information collected using questionnaires included personal details of employees such as sex, age, qualification and job experience, causes of accidents, management of behaviour based safety at Delta Lagers as well as legislation and policy awareness.

3.4.2 Interviews

Research connections (2013) defines interviews as a type of field research method that elicits information and data by directly asking questions of members. A concoction of face to face structured and semi structured interviews were used in this study. Face to face interviews are crucial in that they allow for further asking of detailed questions, further questioning can be done during the interview to collect more data, also the response rate is usually higher as compared to administering questionnaires and non-verbal data can be collected through observation. The target group included the line managers and the SHE manager. Questions asked where in relation to how behaviour affects accidents, how these accidents caused by at risk behaviour can be minimised and for the SHE department to consider further developing its behaviour based safety program.

3.4.3 Field Observations

Field observations involve gathering data primarily through close visual inspection of a natural setting (Research connections 2013). In other words the research will be observing the attitudes of the people in relation to their surroundings. In Behaviour based Safety, the research seeks to identify the at risk behaviour displayed by workers when they will be working. Necessary information was gathered through use of a checklist. The observations focused on issues to do with provision of PPE, unsafe acts displayed by employees and whether employees are willing to change their behaviour once they are cautioned. Field observations offer data that is more accurate as compared to questionnaires as people will not be under pressure to perform or act differently since they will not be aware that they are being observed. The shop floor workers were the ones who were observed and in some instances the behaviour of their supervisors towards safety issues.

3.4.5 Secondary data

According to (Management Study Guide Experts 2015) secondary data is the data that would have been already collected by and readily available from other sources. It is collected for purposes other than those of the research study. To develop a stealth comprehensive study, data was collected from sources that include textbooks, journals, newspapers, the internet and

publications. The information was essential in establishing an in-depth understanding of what behaviour based safety is, trends in occurrence of accidents in the world, the success that has so far been established in implementing a behaviour based safety study and current status of behaviour based safety among a plethora of other issues. This data has the advantage that it is readily available and not only this, it also makes primary data collection more specific since with the help of secondary data, we are able to make out what are the gaps and deficiencies and what additional information needs to be collected (Management Study Guide Experts 2015). Thus primary data alone does not suffice without secondary data.

3.5 Data analysis and presentation

Data analysis is the process of transforming raw data into useable information that is often presented in the form of a published analytical article (Statistics Canada 2014). It consists of processes such as examining, categorizing, tabulating or otherwise re-combining the evidence, to address the initial propositions of a study (Kohlbacher 2006). Data analysis is crucial because it assists in understanding results gathered from surveys and also providing information on any data gaps that would have been established when conducting the survey.

Quantitative data was used to establish relationships between accident occurrence and behaviour of workers and accident statistics were presented by pie charts, graphs and tables by use of SPSS, Microsoft Excel and Microsoft Word. Chi square tests were used in establishing relationships highlighted above. Qualitative data in the form of interviews, field observations and questionnaires was summarised in a manner that was befitting through in-depth explanations. Photographs were taken to enhance the reader's understanding and bring out the reality of the issue under study and were also presented in this research paper. These forms of data presentation assisted in coming up with a coherent and comprehensive study.

3.6 Ethical issues

Research Ethics is defined here to be the ethics of the planning, conduct, and reporting of research and research ethics should include protections of human and animal subjects, relationships between researchers and those that will be affected by their research and options for promoting ethical conduct in research (Resources for Research Ethics Education 2013). Ethical principles in research include human subjects protection, honesty, objectivity, carefulness, confidentiality and responsible publication among a host other factors. The researcher sought permission from the Human Resources department to conduct the research. Issues to do with confidentiality were emphasized to the respondents. It was reiterated to them that their response will be kept private and confidential.

According to Government of Canada (2015) the ethical duty of confidentiality includes obligations to protect information from unauthorized access, use, disclosure, modification, loss or theft. This was strictly adhered to whilst conducting the research. This research did not falsify, misinterpret or fabricate any data so as to protect the respondents. It was also objective as it avoided any bias in data presentation analysis. The research took special precautions with the respondents by respecting their dignity and upholding privacy and autonomy. It also minimized any risk or harms and ensured that more benefits were derived from the information collected thus embracing the human subjects protection principle. The key respondents were made to understand that the research's objective is to justify the need to implement a behaviour based safety program in accident prevention at Delta Lagers. Their interviews and information filled on their questionnaires are strictly confidential and were not used for any other use except to help in coming up with a comprehensive study.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Introduction

This chapter outlines the research findings and is very essential because the validity and reliability of research depends on soundness of data collected. This is made clearer through the use of tables, pie charts and graphs. The chapter explains in detail the causes of accidents at Delta Lagers and management of the behaviour based safety program at the plant thus answering the objectives of the study. An analysis of relationships identified during the study through chi-square tests is also employed in this chapter so as to establish an accurate and robust research.

4.2 Organisational Structure of the Safety Health and Environment department at Delta Lagers

The SHE Department at Delta Lagers is run by a Safety, Health and Environment Manager who resides there at the plant and reports to the group SHE Manager whose offices are also at Delta lagers. The Group SHE manager is the one responsible for running safety issues in Delta Co-operation's northern region which comprises of Harare, Chitungwiza, Kadoma, Chegutu, Norton, Bindura, Mvurwi, Shamva, Chinhoyi, Karoi, Kariba, Marondera, Rusape, Mutoko, Nyanga and Mutare. The organisational structure of the SHE department is shown in Figure 4.1.

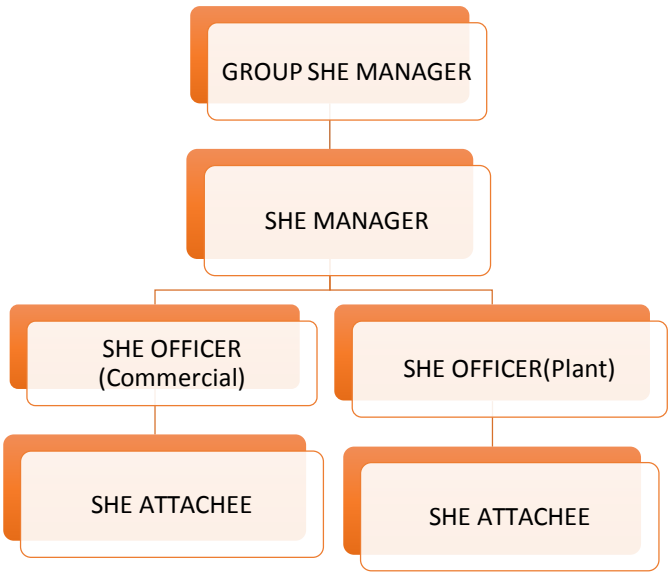


Figure 4.1 Organisational structure

The head of the Safety, Health and Environment department is the SHE Manager whose safety vision is to achieve zero harm through effective management of safety in all managed operations within the Lagers business Unit as picked out from the administered interview. He is the one who ensures that Occupational Safety and Health (OSH) systems and legislation is implemented well and equally has the mandate to run the implementation of the Behaviour based safety program. The Manager works with SHE officers who do most of the ground work like conducting departmental meetings, daily inspections, accident investigations and systems implementation together with the Safety, Health and Environment Attaches.

Information is disseminated at departmental level by SHE Representatives. Each shift has two SHE Representatives and as such Behaviour Based Safety and systems implementation is made easier by their assistance as they work with people most of the time and understand their views on SHE issues. The Safety, Health and Environment Representatives also conduct safety talks in which they encourage others to work safely and promote employee cautioning of unsafe behaviour. Departmental managers also come in handy in management of SHE issues and to ensure rectification of any problems identified by Safety, Health and Environment Representatives. Thus the SHE department at Delta Lagers is getting better daily due to support from the people who work with the SHE Manager.

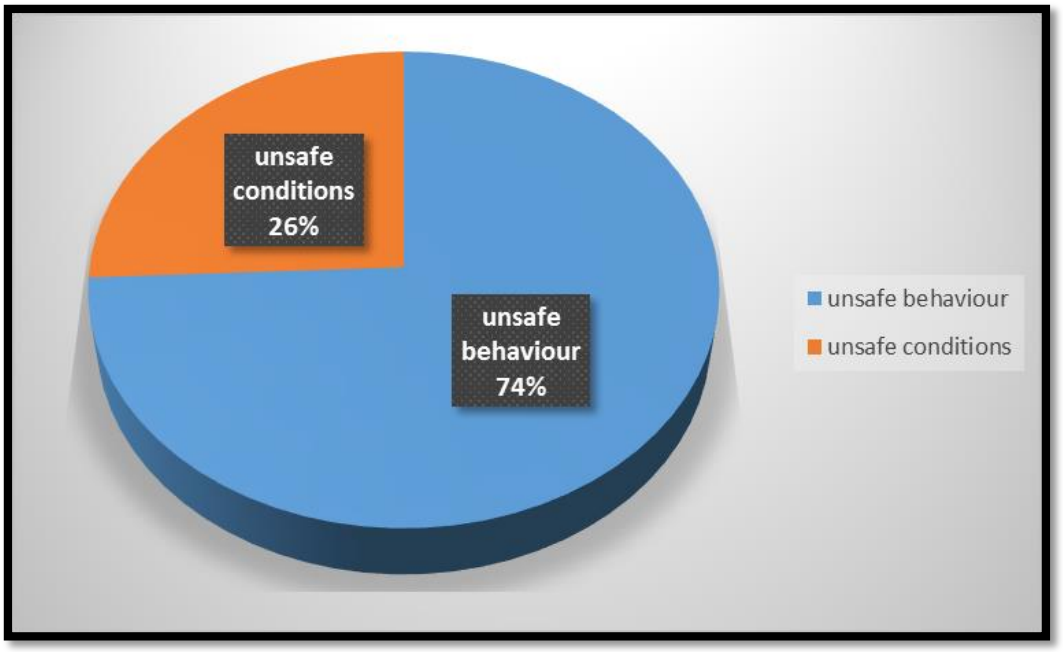
4.3 Causes of accidents at Delta Beverages, Lagers Manufacturing

The responses from the employees revealed that causes of accidents were mostly due to unsafe behaviour and unsafe conditions. This is represented in table 4.1 and figure 4.2.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	unsafe behaviour	26	74.3	74.3	74.3
	unsafe conditions	9	25.7	25.7	100.0
	Total	35	100.0	100.0	

Source: Field data (2016)

Table 4.1 Unsafe behaviour and unsafe conditions leading to accidents at Delta Lagers (%)



Source: Field data (2016)

Figure 4.2 Percentage of unsafe behaviour and unsafe conditions leading to accidents at Delta

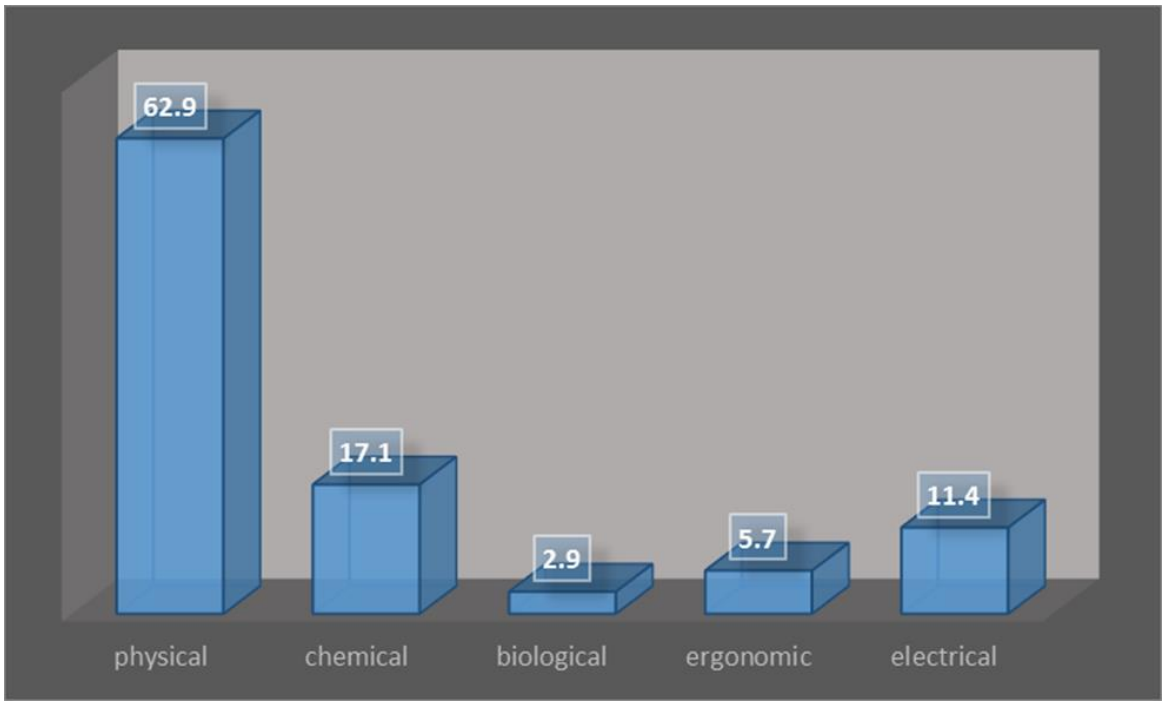
From the administered questionnaires, it was established that 74% of accidents are caused by unsafe behaviours whilst 26% are due to unsafe conditions and as such it is unsafe behaviour that needs to be addressed in order to minimise accidents at Delta Lagers. A plethora of hazards causing accidents were also identified from the administered questionnaires and classified into physical, chemical, biological, ergonomic and electrical hazards. According to (Doucette 2016) a chemical hazard is a source or situation that puts employees at risk of ingesting a substance, inhaling it or absorbing it through the skin. A physical hazard is a source or situation that has the potential to cause intense stress or physical harm to the body. (University of Chicago 2010) defines ergonomic hazards as referring to workplace conditions that pose the risk of injury to the musculoskeletal system of the worker.

Biological hazards are organic substances that pose a threat to the health of humans and other living organisms (Australian Safety and Compensation Council (ASCC) 2011). (Workplace Safety & Prevention Services 2014) define an electrical hazard as a dangerous condition where a worker can or does make electrical contact with energized equipment or a conductor. Table 4.2 shows the hazards identified according to the percentage and these percentages are represented in the form of a bar graph in figure 4.3.

	type of hazard	Frequency	Percent	Valid Percent	Cumulative Percent
Valid	physical	22	62.9	62.9	62.9
	chemical	6	17.1	17.1	80.0
	biological	1	2.9	2.9	82.9
	ergonomic	2	5.7	5.7	88.6
	electrical	4	11.4	11.4	100.0
	Total	35	100.0	100.0	

Source: Field data (2016)

Table 4.2 Type of hazards identified at Delta Lagers



Source: Field data (2016)

Figure 4.3 Type of hazards identified

The graphs above represent the type of hazards identified at Delta Lagers. The most dominant are physical hazards and these include broken glass(cullet), radiation, thermal stress, falling objects, bursting bottles, slips, falls, unguarded machinery, falling from heights, confined spaces and noise. These are followed by chemical hazards which include caustic soda, acids, cleaning products, dust, caustic fumes, ammonia fumes, paints, gasoline and glue. Electrical hazards where also identified from the operation of electrical gadgets and from naked cables. Ergonomic hazards were also identified and they include repetitive movements, vibration, awkward postures, improperly adjusted chairs, limited work space, improper lifting techniques and forceful exertions mostly in the Packaging department. Lastly biological hazards identified include solid media from the micro lab (plates of colonies), mould and wastewater from the Brewing and Packaging departments.

These hazards however differ according to department. In the Packaging department, some of the hazards identified include bottle bursts from bottles with excess carbon dioxide which cause cuts or lacerations, noise above 90db which can lead to hearing impairment, caustic which is used to clean bottles and if it splashes on the skin it causes burns and improperly adjusted chairs which cause back aches. In the Warehouse department, hazards identified include forklifts which pose a threat of collision either with other vehicles or employees, the warehouse tunnel also has poor lighting which reduces visibility, falling cases and potholes that cause a vibration effect to the forklifts when the forklift drivers drive past them and this vibration in turn affects their kidneys.

Hazards identified in the engineering section include electricity which causes electrocution, paints which cause breathing problems if no respirators are used whilst handling them, limited work space and ammonia which is used as a refrigerant. Ammonia, if inhaled results in suffocation which can lead to death. Hazards identified in the Brewing section include, dust at the malt offloading bay where hops and barley used to make beer are delivered and inhalation of this dust causes respiratory infections such as tuberculosis. Acids used for cleaning where also amongst the hazards identified and they pose the risk of skin burns. Lastly ergonomic hazards such as restricted working space and improper lifting techniques were also identified in the Brewing section. More causes of accidents are explained in detail below.

4.4 Unsafe behaviour causing accidents

According to the domino theory, 88% of all accidents are caused by unsafe acts of people, 10% by unsafe actions and 2% by "Acts of God" (Jovanović et al 2004). Research at Delta proved that most accidents are due to unsafe acts as it was established that 74% of accidents are caused by unsafe behaviours from the administered questionnaires. From the unsafe acts identified, 36 % were from the Packaging department, 30% from Warehouse, 18% from Engineering and 16% from the Brewing section. The variation is due to the fact that in the Brewing and Engineering departments, managers and supervisors are fully involved in promoting a safe work environment for employees under their jurisdiction. It's a requirement in their morning meetings to have a Safety, Health and Environment Officer so as to track progress pertaining to SHE issues thus few unsafe acts are bound to be recorded there. SHE Representatives in these departments are ever on their toes ensuring that safety problems are addressed and that accident investigations and problem solving meetings are done on time.

This differs in other departments because safety issues are discussed only once a month in departmental meetings. Supervisors rely mostly on the SHE department to run their safety issues and solutions to identified problems are not actioned on time. This coincides with what (Williams 2008) postulates that managers may inadvertently encourage at-risk behaviour through failure to reinforce a safe behaviour, failure to coach an at-risk behaviour, reinforcing production more than (or instead of) safety and modelling at-risk behaviours. Thus there is need for them to be actively involved in promoting a safe work environment.

In the Packaging department, unsafe acts such as jumping over moving conveyers and working on moving conveyers were picked when the student was conducting her direct observations. One employee explained that one of the conveyers has a problem of jamming and whenever a six pack of drinks is caught in the jam, it is faster to instantly remove the case whilst the conveyer is moving since the switch is far away from his work station.

Although the employee is aware of the consequences inherent in this, he continues to not follow the standard operating procedure as he says he now has 5 years of work experience and none of his fingers have been caught by the conveyer. This shows that the employee has not understood that following stipulated procedure is key in accident prevention. As such, his mind-set needs to be transformed so that he may become more safety conscious. Some of the unsafe acts include driving at unsafe speed and this is mostly done by forklift drivers in the Warehouse department.

These unsafe speeds normally lead to collision with other vehicles and even with other workers. The forklift drivers explained that they normally speed because they will be working under pressure from their supervisors. Work pressure and taking short cuts were again identified as causes of accidents in the work place at Delta and this causes employees to work unsafely so as to meet a certain target. Gordon (2014) explains that when workers take shortcuts at work, especially when they are working around dangerous machinery or lethal chemicals, they are only exposing themselves to a potential catastrophe.

Another unsafe act identified was working without personal protective clothing. From the direct observations, it was picked that Personal Protective Equipment compliance was 60% across all departments. Employees do not wear ear plugs in noisy areas and they expose themselves to hearing impairment. Some of the reasons are that the ear plugs are uncomfortable and for others, they just forget to wear them. Figure 4.4 shows an employee working without ear plugs.

Employee without ear plugs

Source: Field data 2016

Figure 4.4 Employee working without ear plugs

Employees in the Warehouse department also do not wear their hard hats thus putting themselves at risk of sustaining head injuries. Others, again work without gloves when handling broken glass giving the reason that gloves are uncomfortable and this exposes them to hand

cuts. This unsafe behaviour shows that there is need to introduce behavioural change interventions that will put the focus on safety first to both management and shop floor workers. Since the introduction of the cautioning form at Delta Lagers, employees who have been cautioned, have since started to work safely.

Thus formally introducing the observation and feedback process will greatly assist in minimising unsafe acts that lead to most accidents. Drinking was again identified as another unsafe act leading to accidents. Employees are drinking whilst on duty and this shows that they have no concern with their own safety at the work place because once one gets drunk, their chances of being involved in an accident are high. It is these unsafe behaviours that behaviour based safety seeks to address. Thus the formal implementation of BBS at Delta Lagers will greatly assist in minimising unsafe behaviours through the observation and feedback process.

Another unsafe act identified is ignoring safety procedures/regulations. This includes not conducting pre-task risk assessments before commencement of work as well as not isolating machinery. Pre-task risk assessments assist in identifying hazards that can lead to accidents and establishing ways of minimising them. This greatly assists to reduce accidents. During an interview with the Packaging line 6 manager, he highlighted that most accidents are due to employees ignoring safety procedures such as not isolating power supply when they are supposed to especially during maintenance.

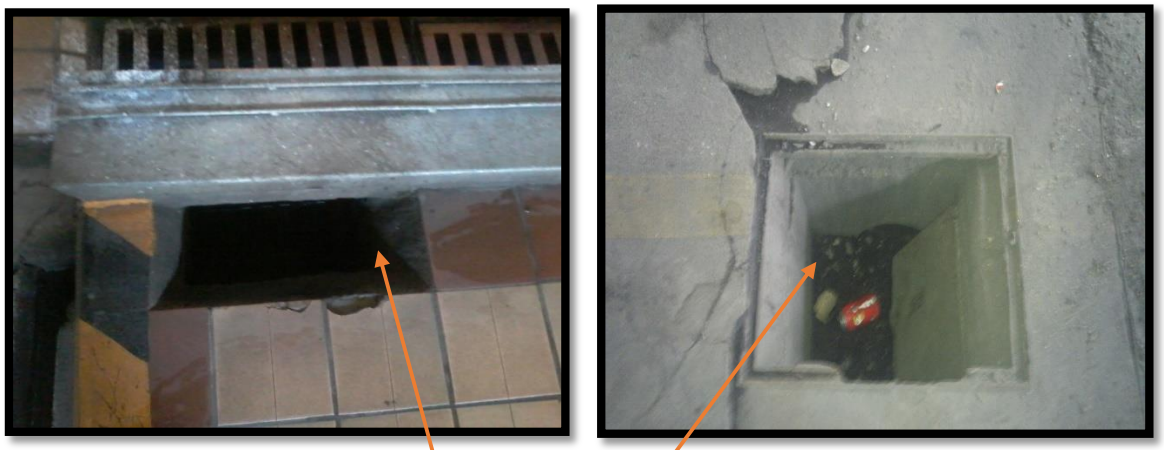
He reiterated the need to conduct safety talks at the beginning of and at the end of every shift so as to promote a safety culture. In an interview with the supervisor from the Engineering department, it was highlighted by him, that employees believe in the saying that *"Strategy is better than strength."* This simply means that a job that should be done by 3 people can be done by 1 person as long she/he has good experience and is tactful. This puts employees in a more precarious position because incidents occur at any time and to anyone including the experienced. As such following procedure/safety regulations and promoting safe behaviour remain key in accident prevention

4.4.1 Unsafe conditions causing accidents

An unsafe condition is a condition in the work place that is likely to cause property damage or injury (Lagrandeur 2013). From the questionnaires, it was drawn that 26% of accidents are due to unsafe conditions. In the Packaging department the unsafe conditions identified include conveyers that do not have guards and uncovered drains. The risk associated with conveyers

that do not have guards is entanglement and entrapment of hands or any other body part. Uncovered drains pose the risk of falling and sustaining leg injuries.

Upon approaching the supervisor about the open drains his response was "*We informed the SHE Department some weeks ago and we are waiting for them to act*." This alone shows that the supervisors themselves need more training pertaining to safety issues and promoting a safe work environment for their employees. The burden is on the SHE department. Thus the need to educate supervisors and managers concerning the need for them to be on the forefront in running safety issues in their respective departments. Having deduced this, a BBS approach has to be formally introduced in the organisation so as to transform the behaviour of managers and supervisors to take responsibility of safety matters. Figure 4.5 shows identified uncovered drains when the student was conducting her research.



Source: Field data (2016)

Figure 4.5 Uncovered drains

Other unsafe conditions identified in Packaging department include defective equipment, steam leaks, hot water pipes that are leaking, and machine failure

In the Warehouse department, unsafe conditions identified include pot holes which are posing a risk of kidney damage to the forklift drivers, poor lighting is also another unsafe condition posing the risk of collision. Another unsafe condition identified in the Warehouse department was that of cases of beer which are stacked three high instead of two high as per requirement according to the Warehouse risk assessment. This poses the risk of the cases falling and causing

product loss as well as head and body injuries for workers in the Warehouse. Poor housekeeping was also picked form the direct observations. The walkway outside Warehouse was cluttered and obstructed as shown in Figure 4.6.

Source: Field data (2016)

Figure 4.6 Cluttered walkway

Moving on to the Brewing department, unsafe conditions identified include dust which was found at the malt offloading bay and this poses a risk of respiratory infections. Employees working at this area ought to work wearing dust masks. Moreover, they are tanks in the Brewing section which have got protrusions which can cause head injuries and employees are encouraged to wear hard hats when working in that section. There is also a lot of noise which is above the stipulated limit of 90decibels and employees are encouraged to wear ear plugs to avoid hearing impairment.

Lastly in the Engineering section, a valve not tightly sealed was identified as an unsafe condition and this valve is causing ammonia to leak. Ammonia if inhaled poses the risk of suffocation which can eventually lead to death. An interview with the SHE Manager revealed that there had been an ammonia leak incident in November 2015 which affected the Southerton Distribution Centre next to Delta Lagers as well as Pharmanova. If these valves are not repaired

soon, there might be a disastrous situation. Management is hesitant to release money to repair the valves as they do not see the urgent need to do so. This shows that the behaviour of management towards safety issues is still laid-back. Moreover, there is a lot of coal dust in the Boiler house, where electricity is generated and this poses the risk of respiratory diseases, pneumoconiosis to be exact and as such there is need to water the coal before it enters into the boilers so as to minimise the dust inhaled by employees. There is also a lot of heat which causes heat stress in the boiler house and employees need water to be hydrated at all times.

Conclusively, from the questionnaires administered, it was found that both unsafe behaviour and unsafe conditions cause accidents but unsafe behaviour contributes the most to accident occurrence.

4.5 Analysis of relationships

In order to establish relationships, tests of significance are used to tell whether differences between two or more sets of sample data are truly significant or they just occurred by chance. Under this test we have two hypotheses. (H_0) is the null hypothesis which shows that there is no relationship between two or more sample sets of data. (H_1) is the alternative hypothesis which shows that there is an association between any identified two or more sample sets of data. Pearson's Chi Square test which is a non-parametric test was used to establish relationships between behaviour and other identified variables. According to the chi-square test, if the chi-square value obtained is less than 0.05 which is the critical value, we reject H_0 and accept H_1 and if the critical value is above 0.05 we reject H_1 and accept H_0.

4.5.1 Accident occurrence and age

In order to fully analyse the relationship between accident occurrence and age, the Chi square test was employed and the following hypotheses were tested:

H_0 - There is no association between accident occurrence and age

H_1- There is an association between accident occurrence and age

The chi-square value obtained is 0.802 which is above 0.05, the critical value. In such an instance we reject H_1 and accept H_0 which says that there is no association between age and accident occurrence. In other words accidents due to unsafe acts at Delta Lagers happen amongst all age groups and as such there is need to ensure that Behaviour Based Safety is introduced and trained to all employees across the plant as a tool for accident prevention.

Table 4.3 Chi-square test for accident occurrence and age

Chi-square tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	6.964[a]	11	.802
Likelihood Ratio	4.575	11	.950
N of Valid Cases	15		

a. 24 cells (100.0%) have expected count less than 5. The minimum expected count is .07.

4.5.2 Relationship between age and implementation of safety incentive program

To determine whether there is any association between age and implementation of safety incentive program, the following hypotheses were tested:

H_0- There is no association between age and implementation of safety incentive program

H_1- There is an association between age and implementation of safety incentive program

This test helps us to understand how the age of an individual determines their behaviour towards implementation of behaviour based safety as the safety incentive issue is part of the BBS program. Table 4.5 shows the chi-square figure obtained.

Table 4.4 Chi square test for age and implementation of safety incentive program

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.258[a]	34	.826
Likelihood Ratio	11.271	34	1.000
N of Valid Cases	33		

a. 54 cells (100.0%) have expected count less than 5. The minimum expected count is .03.

The Chi square figure of 0.826 is greater than 0.05 and therefore, we reject H_1 and accept H_0 which says that there is no association between age and implementation of safety incentive program. This means that all workers, despite their age, see the need to offer safety incentives in order to boost the morale of employees and promote safe behaviours. Thus the concern on issue of working safely cuts across all age groups at Delta Lagers. This then justifies the need to formally introduce BBS in accidents prevention to all employees.

4.5.3 Association between job experience and unsafe acts

In order to establish whether there is any association between job experience and unsafe acts, a Chi Square test was administered and the results are shown in the table below. The following hypotheses were tested:

H_0 There is no association between job experience and unsafe acts

H_1 There is an association between job experience and unsafe acts

The Chi square value obtained in table 4.6 is 0.056 which is larger than 0.05. In such an instance we reject H_1 and accept H_0. Thus there is no association between job experience and occurrence of unsafe acts. When interpreted this means that unsafe acts are done by almost all employees despite work experience. Unsafe behaviour is not minimised by work experience but rather by promoting a safety culture through education on BBS which helps to promote observations and

giving feedbacks amongst employees to create a safe work environment. This again justifies the need to adopt a Behaviour based safety strategy in accident prevention at Delta Lagers.

Table 4.5 Chi square test for job experience and unsafe acts

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	17.921[a]	10	.056
Likelihood Ratio	11.580	10	.314
N of Valid Cases	35		

a. 16 cells (88.9%) have expected count less than 5. The minimum expected count is .06.

4.5.4 Relationship between education level and need to adapt BBS observation and feedback process

To determine the relationship between education level and need to adapt BBS observation and feedback process, the Chi square test of significance was used. The following hypotheses were tested:

H_1 There is an association between education level and need to adapt BBS observation and feedback process

H_0 There is no association between education level and need to adapt BBS observation and feedback process

Table 4.6 Chi-square test for education level and need to adapt BBS observation and feedback process

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	16.985[a]	4	.002
Likelihood Ratio	6.309	4	.177
N of Valid Cases	35		

a. 9 cells (90.0%) have expected count less than 5. The minimum expected count is .03.

A chi-square value of 0.002 was obtained from this test and this value is smaller than the critical value 0.05. Thus we reject H_0 and accept H_1 which says that there is an association between education level and need to adapt BBS observation and feedback process. This particular test is significant in establishing how educational level affects behaviour of employees on matters to do with BBS and why it is vital to train employees on BBS. Of the 35 people interviewed 24 hold certificates/diplomas and they all support the introduction of a BBS observation and feedback process in accident reduction. This can be justified by that the education that they have received has made them to become more analytical in problem solving issues. Equally BBS programs successfully "act people into thinking differently" (Geller, 2001) in (American Psychological Association (2016) and in other words, they change behaviour first in order to change attitude. As such education acquired from Behaviour Based Safety will help transform the mind of workers to working safely based on the knowledge they would have attained. Thus introducing the approach with no training will not yield much results. As such, there is need to train employees on how adopting a Behaviour Based Sasfety approach will assist in accident reduction so as to be able to sustain the BBS system.

4.5.5 Association between working hours and behaviour

To ascertain any association between working hours and behaviour, the chi square test was employed. The following hypotheses were tested:

H_0 -There is no association between working hours and behaviour

H_1-There is an association between working hours and behaviour

Table 4.7 Chi square test for association between working hours and behaviour

Chi-Square Tests	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	13.757[a]	6	.032
Likelihood Ratio	15.221	6	.019
N of Valid Cases	35		

A. 9 cells (75.0%) have expected count less than 5. The minimum expected count is .06.

The Chi-square value is 0.032 which is less than 0.05, the critical value, thus we reject H_0 and accept H_1. This means that there is an association between working hours and behaviour of employees. It was identified from the data collected that long working hours that go beyond the normal eight working hours will make employees experience fatigue, lose concentration and eventually engage in unsafe behaviour. (White and Beswick 2003) elucidates that if there is insufficient recovery time (e.g., due to long work hours) then eventually fatigue will accumulate and affect well-being and health outcome. Thus putting workers at risk of being involved in accidents.

Indeed, Wellens (2001) in (White and Beswick 2003), noted that fatigue caused by long working hours has been cited in previous man-made disasters, such as Chernobyl or the Exxon Valdez oil spill. These long working hours are usually set by management as such there is dire not to effectively train management and the shop floor workers on the need to stick to working for eight hours per day so as to promote safe work practices and avoid accidents. A research conducted among the adult working population in the United States of America proved that working in jobs with overtime schedules was associated with a 61% higher injury hazard rate compared to jobs without overtime (Banks *et al* 2005).

From the results obtained from the analyses it can be concluded that employees engage in unsafe behaviour due to ignorance or lack of education on why it is important for them to follow set safety procedures. Added to this management's response to these unsafe acts will determine the action that employees will take. Moreover, as has been established, unsafe acts are not related to age and job experience, they are done by almost all employees despite age and job experience. This then justifies the need to formally adopt the Behaviour based safety

approach in accident prevention at Delta Lagers for all employees including the managers across the plant.

4.6 Management of Behaviour Based Safety at Delta Lagers

The Behaviour based safety process is applied in the following stages, training of employees and managers on BBS, design of the process by an implementation team, development of the checklist to be used, conducting the physical observation and evaluating the effectiveness of BBS through management involvement in solving problems raised during the observation and feedback process as well as conducting external audits. These processes act as a benchmark to evaluate management of BBS at Delta. Fig 4.7 represents the BBS process diagrammatically.

Source: Field data (2016)

Figure 4.7 BBS implementation process

The following is a discussion on behaviour based safety measures being taken in accident prevention at Delta Lagers. Behaviour Based Safety at Delta Lagers is still in its initial stages. Few employees and managers have so far been trained on BBS. The implementation team

consists of the two SHE Officers, the SHE Representatives, few managers and supervisors from across the plant and their duty is to oversee the administration of the Behaviour Based Safety process. Cautioning forms have been introduced in promoting the observation and feedback process. SHE Representatives and supervisors are the ones who have so far been authorised to observe employees and issue out violation forms. If one is caught not following a safety procedure, they are given a violation form and instantly given corrective feedback. Upon receiving three violation forms, one is taken for a hearing.

This method has however been found with the weakness that other employees are no longer reporting incidents for fear of being given a violation form. The SHE Representatives and Supervisors also have the duty of identifying employees who are practicing safe acts and these are appreciated through food hampers on a safety day organised by the SHE department. From the questionnaires administered, it was also discovered that most employees are keen to change their behaviour once cautioned. 88.6% of the people who filled in questionnaires admitted this to be true and that it assists in minimising accidents as employees become aware of the need to work safely. Table 4.8 shows the percentage of people who agreed that employees are willing to change their behaviour once cautioned.

Table 4.8 showing responses on the role of employee cautioning in accident prevention

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	yes	31	88.6	88.6	88.6
	no	4	11.4	11.4	100.0
	Total	35	100.0	100.0	

As most employees are keen to change their behaviour after being cautioned, this therefore justifies the need to formally adopt behaviour based safety in accident prevention. The BBS process is also currently being sustained through alignment of process with current Occupational Health and Safety Assessment Series (OHSAS) 18001 and National Occupational Safety Association (NOSA) systems that the organisation is running. Clause 4.3.1c of OHSAS 18001 requires that human behaviour be taken into account when identifying

hazards and coming up with control measures. Thus by implementing this clause, the organisation will be also meeting the requirements of the Behaviour Based Safety program. Also managers have recently become involved in issuing violation forms and correcting unsafe behaviour.

This has been helping to grow the BBS system. An interview with the SHE Manager, he revealed that since the introduction of the safety violation forms and acknowledgement for safe behaviour, unsafe acts have since reduced and this has begun to have a bearing on incident reduction. One of the SHE Manager's goal for 2016 towards formally implementing BBS is to introduce a card system. The Behaviour Based Safety card system is a systematic process that helps create an environment where employees are rewarded for safe behaviour and counselled for unsafe behaviour. Under this system, a red card is given for unsafe behaviour and a green card for safe behaviour. Figure 4.8 shows how the system is going to be launched.

Source: (Field data 2016)

Figure 4.8 BBS Card system

The BBS card system is to be run by departmental managers as well as the SHE manager. The managers and employees will receive training on how the system is to be run and the system will then start running. The Safety, Health and Environment manager then concluded the

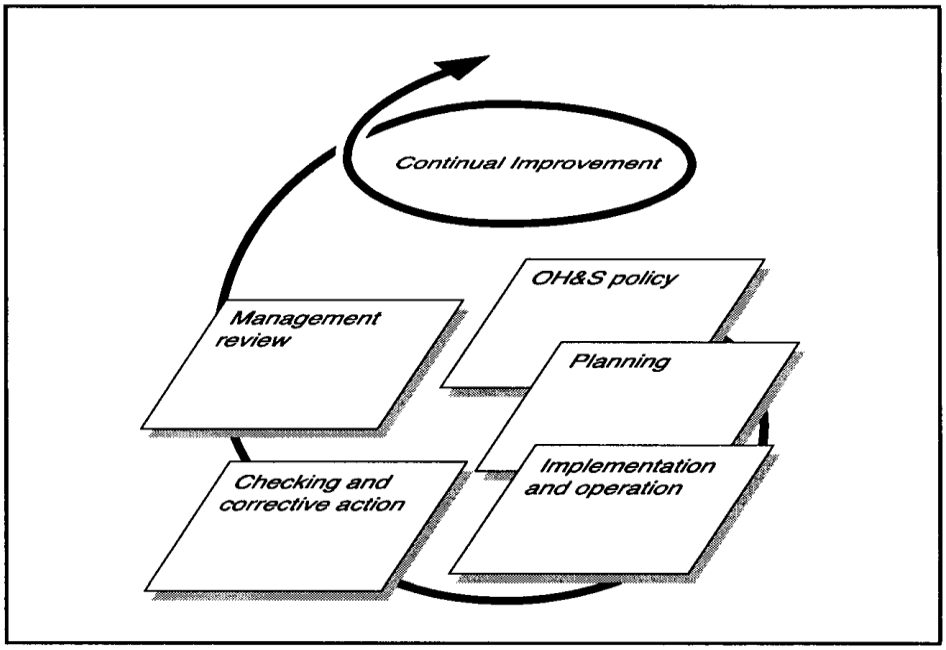
interview by highlighting that they will definitely adopt BBS in order to minimise accidents through training shop floor workers, managers and supervisors.

On a different note, it is of importance to note that most males were not willing to respond to the questionnaires as they were complaining that management is not taking safety issues seriously as they do not attend accident investigations, departmental meetings and take long to get rid of unsafe conditions that would have been identified in the plant. This shows that their behaviour in terms of safety issues is laid back. However once they get involved, employees will be more encouraged to work safely. This coincides with what (Geller, 2008, 2005, 2002) in (Williams 2005) says that managers play a crucial role in developing and maintaining an ideal safety culture. Management involvement displays a sense of importance in terms of safety matters and as such employees are keener to co-operate. In light of the above discussion, it can be concluded that with progress that has so far been noted, formally implementing a behaviour based safety approach at Delta Lagers will greatly assist in accident reduction.

4.7 Behaviour based safety and Occupational Health and Safety Management systems

The Occupational Health and Safety systems that are currently being used at Delta Lagers to promote a safe work environment include the Occupational Health and Safety Assessment Series 18001 (OHSAS), a British standard and the National Occupational Safety Association (NOSA), initiated in South Africa and has a thrust on occupational risk management.

According to (British Standards Institution 2016), OHSAS 18001 sets out the minimum requirements for occupational health and safety management best practice. The standard has got stipulated requirements that an organisation should meet when managing the health and safety of employees. One of the clauses that relates to Behaviour based safety is clause 4.3.1 on hazard identification, risk assessment and determining controls. An organisation shall identify and document hazards and risk associated with its work environment and also determine the necessary controls in order to prevent injury. And according to clause 4.3.1c of OHSAS 18001, human behaviour should be taken into account when determining controls for identified hazards. Of great importance to note is also that the OHSAS standard works with a Plan, Do, Check, Act cycle shown in Figure 4.9.



Source: OHSAS 18001:2007 standard

Figure 4.9 OHSAS 18001 Plan, Do, Check, Act cycle

An organisation is required to firstly set its processes and objectives in implementing the OHSAS 18001:2007, implement the processes and objectives, monitor if the processes are in line with the OHS policy and if deviations are noted there is then need to establish corrective actions and act on the identified corrective actions. This cycle is important in ensuring that the BBS process is sustained. As the organisation constantly monitors and corrects its processes, clauses that address behaviour management will also be dealt with thus also acting as a way of sustaining the Behaviour Based Safety process.

Furthermore clause 4.4.2 of OHSAS 18001 mentions that an organisation shall identify OH&S related training needs and ensure that employees are equipped with information on how to prevent injuries and promote a safe work environment. This is in conformance to the Behaviour based safety program as it requires that all employees ought to be trained on how controlling behaviour helps to minimise accidents. Added to this, clause 4.5 of the same standard then requires that an organisation checks or monitors its OH&S perfomance through setting up a monitoring procedure. As such, in monitoring its Occupational, Health and Safety perfomance and complying with the requirements of the standard, Delta Lagers has to formally adopt the BBS approach as a standard to monitor accident prevention.

Behavioural issues, with a thrust of promoting safe behaviours, are also covered by the National Occupational Safety Association (NOSA) standard. In the NOSA manual, clause 5.00 on organisational management encourages the management to offer incentives to employees who would have identified and corrected unsafe behaviours and unsafe conditions. This requirement is under clause 5.23 on suggestion schemes. Rewards are also given to employees who bring forward good suggestions on how to improve the safety and health of workers at the work place. Delta Lagers already acknowledges and rewards safe behaviour and good SHE suggestions. Behaviour based safety program thus complies with the NOSA standard in that it promotes the need to give safety incentives and acknowledge safe behaviours in order to boost the morale of employees which is an effective tool in accident prevention. Thus to fully comply with the standard, Delta Lagers has to formally adopt BBS in accident prevention.

4.8 Behaviour Based Safety and the Legal Framework

According to (NSSA 2012), people spend about a third of the day at work, which means the working environment can have a major impact on their health. Governments find it necessary, therefore, to enact legislation regulating working environments in the interests of employer's and employees' safety and health. There is numerous legislation that touch on Occupational health, safety and environment issues but the ones that are relevant to this study and that will be under discussion include the Factories and works act, Pneumoconiosis act , National Social security authority act and Environmental Management Act.

NSSA (2012) elucidates that the Factories and Works act Chapter 14:08 of 1996, provides for the registration and control of factories, the regulation of conditions of work in factories, supervision of the use of machinery and precautions against accidental injury to persons employed on structural work. Precautions stated in Part V of the act do not include the need to address human behaviour in order to minimise accident occurrence. Precautionary measures that are taken if someone violates the law include the payment of fines and imprisonment. These have got the limitation that they do not deal away with the laid back behaviour that employees have towards safety issues thus less progress will be made in minimising unsafe acts at the work place.

The same issue applies to the Pneumoconiosis act. Pneumoconiosis is a respiratory disease that develops due to inhalation of hazardous dust and especially affects the workers in the mining and manufacturing industries. Once it sets in, it inhibits proper gaseous exchange in the alveoli and causes the lungs to become fibrotic. The legislation that was then promulgated in

order to control this disease is the Pneumoconiosis act. According to (NSSA 2013) the act seeks to protect those working in dusty occupations from the danger of contracting the disease. The Act however is implicit instead of explicit on managing behaviour in preventing the contraction of pneumoconiosis. Unsafe behaviours such as not wearing dust masks in dusty areas and managers not providing workers with adequate PPE to protect them can result in workers contracting the disease. In such instances behaviour management becomes key in protecting workers. Hence there is need to promote safe work behaviours in work places to prevent such incidents.

The Environmental management Agency was formed as a result of the Environmental Management act of 2002 in order to promote sustainable utilisation and protection of Zimbabwe's environmental goods and services as elucidated by (EMA 2011) in the Herald newspaper. This act relates to this study because (NSSA 2012) proved that Environmental factors, such as poor visibility, heat, noise, dust and wet conditions, are responsible for four percent of workplace accidents. The Environmental Management Act touches on establishment of the environmental management agency, environmental council, environment funds, establishing environmental quality standards and conservation and improvement of environment among other issues. It is again silent on managing human behaviour in order to protect the environment and eliminate noise, heat and poor visibility which might cause work place accidents which is a cause for concern as it has been proved that most accidents at the work place are due to unsafe behaviour. In order for the environment to be safe to work in, it has to be protected by human beings hence there is need to address human behavioural issues in the Environmental Management Act of Zimbabwe.

The NSSA Act is another piece of legislation that also governs occupational health and safety issues in Zimbabwe. The NSSA board was established and constituted from the Act in order to ensure social security to workers. NSSA is administering two schemes: Pension and Other Benefits Scheme and Accident Prevention and Workers' Compensation Scheme, although, in an endeavour to provide a more comprehensive social security package for the Zimbabwean society, groundwork for the introduction of more schemes is underway (NSSA 2012). The boards however acknowledges the fact that the majority of workplace accidents are caused by human factors rather than by machine faults, making safety consciousness, training and procedures the key element in promoting safety at work (NSSA 2012).

However having established this, the act itself is silent on issues relating to human behaviour. The Act has issues to do with establishment of social security schemes, formation of the National social security board, functions of the board, final provisions relating to authority and appeals. One reason to explain this might be the fact that the Act was enacted in 1989 hence much research might not have been made to prove that most accidents are due to human behaviour than machinery faults. As such there is need to make amends so as to include management of human behaviour in accident prevention.

CHAPTER FIVE

CONCLUSION AND RECOMMENDATIONS

5.1 CONCLUSION

Behaviour based safety is key in promoting accident reduction at the workplace. It has been proved that most accidents are due to unsafe acts rather than unsafe conditions. At Delta Lagers, it has been identified that 74.3% of accidents are caused by unsafe behaviour whilst 25.7 are due to unsafe conditions. Major unsafe acts identified by management include ignoring safety procedures such as not following the lock out procedure, not wearing adequate Personal Protective Equipment, over speeding by forklift drivers as well as operating on moving equipment such as moving conveyers. Thus having established behaviour as the major cause of accidents, the Delta Safety Health and Environment Manager has shifted his focus to introducing the Behaviour Based Safety program in accident prevention.

It was also established that prior to the introduction of the safety violation form as a way of laying the foundation for the Behaviour Based Safety program, employees were reluctant to wear their Personal Protective Equipment and they were a lot of unsafe acts being identified. However with the introduction of the violation form, they have started to experience 80% Personal Protective Equipment Compliance from 40% Personal Protective Equipment Compliance which is indeed a great improvement. Unsafe acts have started to decline especially with the Safety Health and Environment incentives being given to workers under the Safety Health and Environment suggestion scheme clause 5.23 of the NOSA standard. 88.6% of workers alluded to the fact that observation and feedback process will greatly assist reduce accidents whilst only 11.6% were against the idea. As such from this overwhelming evidence it can be justified that formally introducing Behaviour Based Safety at Delta Lagers will greatly assist in reducing accident occurrence.

The level of awareness of managing accidents through introduction of the Behaviour Based Safety program is satisfactory among managers, supervisors and shop floor workers as the response showed that most of the employees are most certain that formally introducing the Behaviour Based Safety program will greatly assist in accident reduction. The research established that the legislation in Zimbabwe has not incorporated behaviour management in accident prevention which really is a key issue which needs to be looked into. Conclusively positive results are likely to be yielded in terms of accident reduction at Delta with the formal

adoption of Behaviour Based Safety program as shown by the current progress being made in Personal Protective Equipment compliance and reduction of unsafe acts being identified.

5.2 RECOMMENDATIONS

From the derived results, findings and conclusion, the following recommendations were suggested:

- Delta Beverages, Lagers manufacturing should improve Behaviour Based Safety awareness through training all of its employees including top management and setting up refresher trainings in order to sustain the Behaviour Based Safety program. Moreover more Safety Health and Environment related awareness trainings should be done to promote safe work practices.
- The Safety Health and Environment department should formally adopt the Behaviour Based Safety program as a way of reducing accident occurrence and complying with OHSAS 18001 and NOSA standards and draft a proper Behaviour based safety management strategy.
- To ensure the outright applicability of the Behaviour Based Safety program, management should be fully involved in problem solving issues relating to accidents, ensure that employees are given appropriate Personal Protective Equipment/Clothing on time, rectify any deviations that would have been identified on time, actively be involved in departmental meetings and establish good relations with shop floor workers in order to understand their behaviours.
- Delta Beverages, Lagers manufacturing should deploy at least one Safety Health and Environment Officer in each department. If a Safety Health and Environment Officer narrows down his/her focus on one department, more progress can be made, tracking the closure status of issues raised in departmental meetings and safety audits for example becomes much better and easier.
- The Plant Manager should enforce the need for managers and supervisors in different departments to be solely responsible of ensuring that employees are working in a safe work environment if the Behaviour Based Safety program is to yield positive results. Consequences should be set for managers who do not take responsibility of the safety of employees under their jurisdiction.
- Employees should be given the right at the work place to refuse to work whenever the conditions are unsafe for them to do so as this is already their legal right. Managers that will force managers to work under unsafe conditions will be taken for a hearing.

- The Safety Health and Environment department should include in their Safety Health and Environment inductions issues related to Behaviour based safety as well as conduct refresher inductions for all employees in order to sustain the Behaviour Based Safety program, promote a safe work environment and ensure full compliance to legislation.
- Action trackers developed from Safety audits, Behaviour Based Safety feedback and observation process, departmental meetings, risk assessments and planned job observations should be flashed in daily meetings conducted by the departmental manager in order to quickly rectify safety problems identified and minimise the reoccurrence of accidents.
- The Safety Health and Environment Legislation should incorporate behaviour related issues in accident prevention as unsafe behaviour has already been identified as the major cause of occupational accidents.

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APPENDIX 1

MIDLANDS STATE UNIVERSITY

DEPARTMENT OF GEOGRAPHY AND ENVIRONMENTAL STUDIES

QUESTIONNAIRE SURVEY: THE EFFECTIVENESS OF IMPLEMENTING A BEHAVIOUR BASED SAFETY APPROACH IN ACCIDENT PREVENTION. A CASE OF DELTA BEVERAGES, LAGERS MANUFACTURING

The questionnaire has been designed to analyse the effectiveness of implementing a behaviour based safety approach in accident prevention at Delta Beverages. The information that will be obtained is confidential and is to be used for academic purposes.

FIELDWORKER…… PLACE……

DATE…….. QUESTIONNAIRE NO……..

May you kindly answer all questions and do no write your name on the questionnaire as the information is strictly confidential. Indicate your answer with a tick in the boxes provided.

Section A: Personal details

1. Sex: Male ☐ Female ☐
2. Age……
3. Marital Status: Single ☐ Married ☐ Divorced ☐ Widowed ☐
4. Highest academic qualification: From 2 ☐ O'Level ☐ A 'Level ☐
5. Highest Professional qualification: Certificate/Diploma ☐ Degree ☐
6. Job experience: 0-5years ☐ 6-10years ☐ 11-15years ☐ 16-20years ☐ 21-25years ☐ 25 and above ☐
7. Salary range: Below $50 ☐ $151-250 ☐ $251-350 ☐ $351-450 ☐ $451-550 ☐ $551^{+} ☐

Section B: Causes of accidents

Hazards can be classified into physical e.g. noise and radiation, chemical e.g. toxic substances, biological e.g. viruses, electrical e.g. machinery, ergonomic e.g. restricted work space, environmental hazards e.g. lack of skills.

8. What are the types of hazards associated with your task

a)……..

b)……...…...

c)……...

d)……...

e)……

f)…….

g)……

9. What are some of the causes of accidents in your work place?

I. ……

II. ……

III. …….....

IV. ……

V. ……

VI. ……

VII. …….

10. How often do you encounter accidents that occur as a result of unsafe acts? Rare☐

Often ☐ Very often ☐

Explain your answer

……

……

…….

Section C: Management of the behaviour based safety approach

11. Working hours: 8hours☐ 12 hours☐ 18hours☐ Others (specify)☐

b) Do these affect the behaviour of employees in any way?

……

…….

12. Does top management demonstrate an interest in the safety and health of employees:

Yes ☐ No ☐

b) Explain your answer on the space provided:

……

……

13. Do you believe observing and giving feedback to each other helps to minimise unsafe acts?

……

……

14. Are employees keen to change their behaviour once they are cautioned?

……

……

15. What, in your opinion needs to be done in managing the unsafe behaviour of employees that lead to accidents?

……

……

16. A safety incentive program will help employees to work safely, Explain your answer on the space provided: Agree ☐ Disagree ☐

……

……

Section D: Legislation and Policy issues

17. Does the organisation have an occupational, safety and health policy? Yes ☐ No ☐

b) What do you understand concerning the organisation's occupational, safety and health policy?

……

……

18. What legislation governs the safety and health of employees at your work place?

a) ……

b) ……

c) ……

d) …….

e) ……

19. Is there anything that shows that the organisation is complying with this legislation? Explain

……

……

20a). What can be done to increase legislation and policy awareness at Delta?

……

…….

b) How can compliance to legislation be improved?

……

……

……..

Thank you very much for your kind co-operation. God bless you!

APPENDIX 2

Interview guide for the SHE Manager

1. What are the main causes of accidents at Delta Beverages, Lagers Manufacturing?
2. How are these accidents prevented from reoccurring?
3. From your accident causes, does the behaviour of employees have much to do with the occurrence of most of your accidents?
4. In what ways are you promoting safe behaviours in the work environment?
5. Does Delta Beverages have an established Behaviour based safety programme?
6. If yes, how is the programme being implemented?
7. If not, do you feel introducing this programme will help minimise accidents?
8. Are they any changes in occurrence of accidents and safety violations from the time that you a adopted a behaviour based safety approach to date
9. Do you intend to formally adopt a behaviour based safety approach in accident prevention?

APPENDIX 3

Interview guide for Managers and Supervisors

1. What are the main causes for accidents for the employees under your jurisdiction?
2. Does their behaviour contribute to accident occurrence?
3. If yes, may I have examples of these unsafe behaviour?
4. Can we safely say that the behaviour of employees at Delta is directly related to accident occurrence?
5. How best can these accident be minimised
6. Do you feel addressing the at-risk behaviour has assisted in minimising accidents
7. Should the Safety, Health and Environment department consider further developing its behaviour based safety approach in accident prevention

APPENDIX 4

Interview guide for Clinic staff

1. What do you perceive to be the main causes of accidents from your discussions with the employees that you attend to?
2. Could their behaviour be a contributing factor and if so, explain your answer
3. How best can their at risk behaviour be dealt with?
4. Will implementing a behaviour based safety approach in accident prevention be useful in any way?

APPENDIX 5

Observation checklist

1. Are safety and health hazards identified and communicated to employees
2. Are employees supplied with sufficient Personal Protective clothing that suit their tasks?
3. Are they any unsafe acts that you can identify as employees are working?
4. Are employees cautioning one another for performing unsafe acts?
5. Does the employees who would have been cautioned change his/ her behaviour?
6. Are supervisors on the watch to see if employees are working safely?